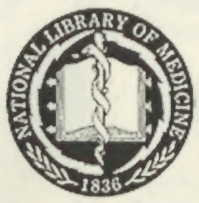

United States Government Accountability Office

GAO

Report to Congressional Requesters

January 2006

DRINKING WATER

EPA Should Strengthen Ongoing Efforts to Ensure That Consumers Are Protected from Lead Contamination

GAO

Accountability * Integrity * Reliability

GAO-06-148

January 2006

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Highlights

Highlights of GAO-06-148, a report to congressional requesters

Why GAO Did This Study

Elevated lead levels in the District of Columbia's tap water in 2003 prompted questions about how well consumers are protected nationwide. The Environmental Protection Agency (EPA), states, and local water systems share responsibility for providing safe drinking water. Lead typically enters tap water as a result of the corrosion of lead in the water lines or household plumbing. EPA's lead rule establishes testing and treatment requirements. This report discusses (1) EPA's data on the rule's implementation; (2) what implementation of the rule suggests about the need for changes to the regulatory framework; and (3) the extent to which drinking water at schools and child care facilities is tested for lead.

What GAO Recommends

Among other things, GAO recommends that EPA improve its data on key aspects of lead rule implementation, strengthen certain regulatory requirements and oversight, and assess the problem of lead in drinking water at schools and child care facilities. In commenting on a draft of this report, EPA generally agreed with our findings and recommendations.

www.gao.gov/cgi-bin/getrpt?GAO-06-148.

To view the full product, including the scope and methodology, click on the link above. For more information, contact John B. Stephenson at (202) 512-3841 or stephensonj@gao.gov.

DRINKING WATER

EPA Should Strengthen Ongoing Efforts to Ensure That Consumers Are Protected from Lead Contamination

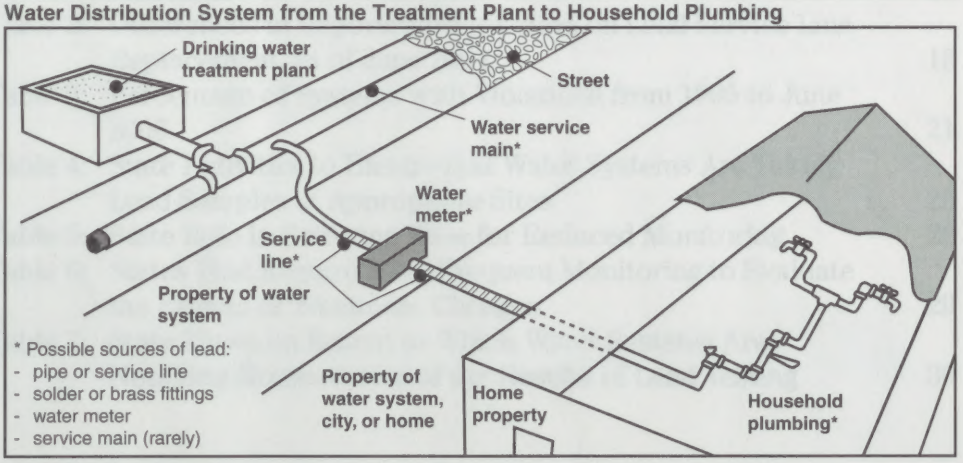
What GAO Found

EPA's data suggest that the number of drinking water systems with elevated lead levels has dropped significantly since testing began in the early 1990s. However, EPA's database does not contain recent test results for over 30 percent of large and medium-sized community water systems and lacks data on the status of water systems' efforts to implement the lead rule for over 70 percent of all community systems, apparently because states have not met reporting requirements. In addition, EPA's data on water systems' violations of testing and treatment requirements are questionable because some states have reported few or no violations. As a result, EPA does not have sufficient data to gauge the rule's effectiveness.

Implementation experiences to date have revealed weaknesses in the regulatory framework for the lead rule. For example, most states do not require their water systems to notify homeowners that volunteer for periodic lead monitoring of the test results. In addition, corrosion control can be impaired by changes to other treatment processes, and controls that would help avoid such impacts may not be adequate. Finally, because testing indicates that some "lead-free" products leach high levels of lead into drinking water, existing standards for plumbing materials may not be sufficiently protective. According to EPA officials, the agency is considering some changes to the lead rule.

On the basis of the limited data available, it appears that few schools and child care facilities have tested their water for lead, either in response to the Lead Contamination Control Act of 1988 or as part of their current operating practices. In addition, no focal point exists at either the national or state level to collect and analyze test results. Thus, the pervasiveness of lead contamination in the drinking water at schools and child care facilities—and the need for more concerted action—is unclear.

Water Distribution System from the Treatment Plant to Household Plumbing



Source: EPA.

Contents

Figures

Abbreviations

ANSI	American National Standards Institute
EPA	Environmental Protection Agency
LCCA	Lead Contamination Control Act
NSF	NSF International

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United States Government Accountability Office
Washington, D.C. 20548

January 4, 2006

The Honorable James M. Jeffords
Ranking Minority Member
Committee on Environment and Public Works
United States Senate

The Honorable John D. Dingell
Ranking Minority Member
Committee on Energy and Commerce
House of Representatives

The Honorable Hilda L. Solis
Ranking Minority Member
Subcommittee on Environment and Hazardous Materials
Committee on Energy and Commerce
House of Representatives

When testing in the District of Columbia during 2003 revealed that over 4,000 households had elevated levels of lead in their drinking water, the ensuing publicity prompted questions about how well local drinking water systems are protecting consumers from lead contamination nationwide. The adverse health effects associated with exposure to lead can be severe, including delays in normal physical and mental development in infants and young children, and damage to kidneys and reproductive systems for the population at large. Although rarely the sole cause of lead poisoning, lead in drinking water can be a significant contributor to a person's total exposure—and can account for as much as 60 percent of the exposure for infants who drink baby formula or concentrated juices mixed with water. Because children are most vulnerable to adverse health effects from lead exposure, the adequacy of controls over lead in water supplies serving schools and child care facilities is particularly important.[1] In response to the discovery of lead contamination in the District of Columbia, the Environmental Protection Agency (EPA) launched a broad examination of the implementation of drinking water regulations it issued in 1991—known as the Lead and Copper Rule—to determine whether elevated lead levels

[1]For purposes of this report, we are referring to day care centers, nursery schools or preschools, and school-based after school programs as child care facilities.

are a national problem.[2] EPA issued the rule as part of its efforts in implementing the Safe Drinking Water Act, and established testing and treatment requirements to control lead and copper in public water supplies.[3]

Responsibility for ensuring safe drinking water is shared by EPA, the states, and, most importantly, local water systems. In general, EPA sets standards to protect drinking water quality and to ensure the proper operation and maintenance of public water systems. EPA also oversees state implementation of the Safe Drinking Water Act and applicable regulations where states have assumed primary responsibility for enforcement. The states ensure that local water systems meet EPA and state requirements, provide technical assistance, and take enforcement action, as necessary. In addition, the states collect information on the results of drinking water monitoring, among other things, and report the information to EPA. At the local level, public water systems operate and maintain their facilities in accordance with federal and state requirements, periodically test the drinking water to ensure that it meets quality standards, install needed treatments, and report required information to the states.

In contrast to most drinking water contaminants, lead is rarely found in the source water used for public water supplies. Instead, lead enters tap water as a result of the corrosion that takes place over time when materials containing lead in the water distribution system or household plumbing come into contact with water. For example, lead can leach out of service lines, pipes, brass and bronze fixtures, solders, or other materials, and contaminate drinking water. To address this problem, EPA established requirements for corrosion control treatment, source water treatment, lead service line replacement, and public education. The lead rule requires water systems to test the tap water at a specified number of locations that are at high risk of lead contamination.[4] In general, if lead concentrations exceed 15 parts per billion in more than 10 percent of the samples, a water system has exceeded the action level and must (1) provide public education materials to its customers and (2) conduct additional testing to

[2]Because this report examines only those requirements and activities applicable to lead, we will henceforth refer to this rule as the "lead rule." See 40 C.F.R. § 141.80 *et. seq.*

[3]42 U.S.C. § 300f *et. seq.*

[4]Under the lead rule, high risk sites include single-family homes that contain copper pipes with lead solder installed after 1982 or lead pipes—or that are served by lead service lines.

determine if treating lead contamination from the water's source may be necessary. Water systems that exceed the action level may also be required to install corrosion control treatment to reduce the water's corrosiveness. When treatment is not effective in controlling lead levels, a water system must annually replace at least 7 percent of any lead service lines it owns. To further address the problem of lead in household plumbing, the Congress amended the Safe Drinking Water Act in 1986 and 1996 to, among other things, ban the use of lead solder and plumbing materials that are not "lead-free."

In addition, under the Lead Contamination Control Act of 1988, the Congress required the recall of drinking water coolers with lead-lined tanks, banned the manufacture and sale of water coolers that were not lead-free, and required states to establish programs to assist local agencies in testing and correcting for lead in water supplies in schools and child care facilities.[5] While the Consumer Product Safety Commission was responsible for managing the recall, EPA was responsible for distributing a list of banned coolers and publishing and distributing guidance on detecting and remediating lead contamination in school drinking water supplies.

In March 2005, we issued a report that focused on the lead contamination problem in the District of Columbia's drinking water supplies.[6] For a national perspective on controlling lead in drinking water, you asked us to determine (1) the extent to which EPA has sufficient data to oversee implementation of the lead rule, (2) what implementation of the rule to date suggests about the need for changes to the regulatory framework, and (3) the extent to which drinking water supplies at schools and child care facilities are tested for lead and their users protected from elevated lead levels. For information on the data EPA uses for oversight of lead rule implementation, we analyzed EPA data on the results and frequency of lead testing, the status of corrective actions, and violations. We determined that the data on results and frequency of testing were sufficiently reliable to show compliance trends. However, we found that other data on corrective

[5]Generally, schools and child care facilities that operate their own water systems are required to test their drinking water under EPA's lead rule. EPA estimates that there are approximately 10,000 such systems in the United States.

[6]GAO, *District of Columbia's Drinking Water: Agencies Have Improved Coordination, but Key Challenges Remain in Protecting the Public from Elevated Lead Levels*, GAO-05-344 (Washington, D.C.: Mar. 31, 2005).

actions and violations were not sufficiently reliable to assess the status of efforts to implement and enforce the lead rule. For information on experiences in implementing the lead rule and the need for changes to the regulatory framework, we analyzed the responses to a 2004 EPA information request on states' implementation policies and practices, the results of EPA-sponsored expert workshops, and relevant documents. We also obtained test results from NSF International on lead content and lead leaching of plumbing fittings and fixtures. To assess data reliability, we obtained information on NSF International's procedures for data quality control and determined that the data were sufficiently reliable for illustrative purposes. For information on efforts to control lead in drinking water at schools and child care facilities, we analyzed the results of a 2004 50-state information request by EPA, an EPA workshop that focused specifically on schools and child care facilities, and relevant documents.

We supplemented the information collected under each objective by contacting state and local drinking water officials in 10 states. We selected eight of the states—California, Illinois, Iowa, Massachusetts, Michigan, New York, Pennsylvania, and Washington—because they either had a relatively high number of water systems with test results that exceeded or fell just below the lead action level, or they added to the geographical diversity of our selections. We also obtained information from Connecticut and Florida, two states that EPA identified as particularly active in addressing potential lead contamination in water supplies serving child care facilities. In all 10 states, we obtained information from state drinking water program managers, state public health or education officials, and local school districts that have efforts under way to test for and remediate lead contamination. (App. I contains a detailed description of our scope and methodology.) We performed our work between June 2004 and November 2005 in accordance with generally accepted government auditing standards.

Results in Brief

While EPA's data suggest that the number of drinking water systems with elevated lead levels has declined significantly since the early 1990s, the agency does not have a complete picture of how states and water systems are implementing the lead rule because data on key aspects of water systems' compliance with regulatory requirements are incomplete or questionable. According to EPA's data, the number of systems exceeding the lead action level dropped by nearly 75 percent from the initial monitoring conducted during 1992 to 1994—shortly after the lead rule took effect—and the period from 2002 to June 2005. However, our analysis

disclosed that EPA's database does not contain recent test results on over 30 percent of the community water systems, apparently because states have not met reporting requirements. EPA's data on the status of water systems' efforts to implement the lead rule are similarly incomplete. The agency requires the states to report certain "milestones" to indicate whether a water system's lead levels are acceptable or whether the system is implementing required corrective actions, such as installing corrosion control treatment and replacing lead service lines. Through June 2005, however, EPA's database did not contain any milestone information on more than 70 percent of the nation's community water systems. Finally, because some states reported few or no violations of lead rule testing and treatment requirements over multiple years, the completeness of these data is questionable. EPA has been slow to take action on these data problems and, as a result, lacks the information it needs to evaluate how effectively the lead rule is being implemented and enforced nationwide.

The experiences of EPA, states, and water systems in implementing the lead rule have revealed weaknesses in the regulatory framework, including both oversight and the regulations themselves, which may be undermining the intended level of public health protection. Consequently, some changes to the regulatory framework are necessary. First, the sites used for lead testing may no longer represent the sites with the highest risk of contamination. For example, when the sampling locations approved initially are no longer available or appropriate, water systems identify new sites and states may not be tracking the changes to ensure that new sites meet high risk criteria. Another concern is that most states do not require their water systems to notify the homeowners who volunteer for periodic lead monitoring of the test results and do not know the extent to which such notifications are actually occurring. In addition, the effectiveness of corrosion control can be impaired by changes to other treatment processes and, in some states, testing and other controls that would help avoid such impacts may not be adequate. Finally, existing standards for plumbing fixtures and devices may not be protective enough, according to some experts, because testing has determined that some of the products defined as "lead-free" under the Safe Drinking Water Act can still contribute high levels of lead to drinking water. To improve implementation of the lead rule, EPA is considering a number of changes to its regulations, such as requiring advance notice of treatment modifications that could affect corrosion control. EPA is also considering changes to its guidance to improve and clarify specific aspects of the lead rule.

Although data are limited, it appears that few schools and child care facilities have tested their water supplies for lead—or adopted other measures to protect users from lead contamination—either in response to the Lead Contamination Control Act of 1988 or as part of their current operating practices. Little data are available to assess (1) the scope and effectiveness of the effort to recall water coolers or (2) the extent and results of any testing. In addition, although the act required states to establish programs to assist local agencies in addressing potential lead contamination at schools and child care facilities, this provision was declared unconstitutional in 1996 and state efforts were generally limited. Current efforts to detect and remediate lead in drinking water at schools and child care facilities appear limited, based on the results of EPA's 50-state information request and our discussions with 10 states. In recent years, some of these facilities have tested voluntarily, and school districts in some cities such as Boston, Philadelphia, and Seattle, have detected elevated lead levels at some drinking water outlets. However, little information exists on the pervasiveness of the problem nationwide because no focal point exists at the national or state level to collect and analyze the test results or share information on effective remediation strategies. State and local officials say that dealing with other environmental problems in their facilities—including lead paint, asbestos, and mold—is a higher priority because more information is available on the nature and extent of these hazards.

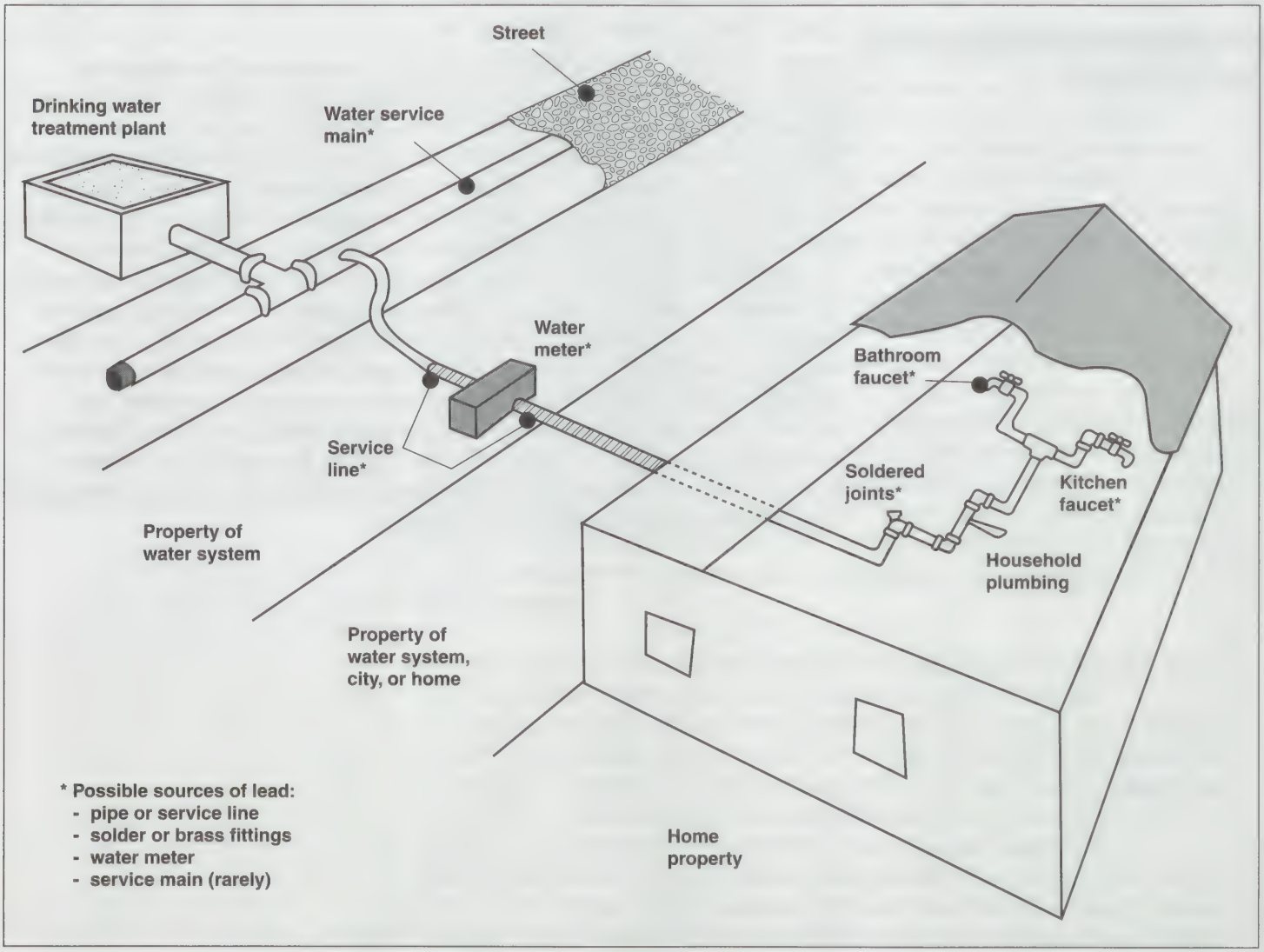
We are making a series of recommendations to improve oversight and implementation of the lead rule. Among other things, we are recommending that EPA take steps to ensure that data on key aspects of lead rule implementation are timely and complete so that the agency is better able to assess the effectiveness of the rule and state oversight and enforcement efforts. Other recommendations focus on strengthening aspects of the regulatory framework, such as lead monitoring requirements, review of treatment changes that could affect corrosion control, and standards for plumbing fittings and fixtures. Finally, we are recommending that EPA collect and analyze existing data to assess the extent of lead contamination in drinking water at schools and child care facilities and appropriate remedial actions. In commenting on a draft of this report, EPA generally agreed with our findings and recommendations. In particular, EPA acknowledged that it needs better data to assess the effectiveness of lead rule implementation and enforcement. In addition, EPA agreed that the aspects of the regulation that we identified as needing improvement warrant additional attention and noted its plans to address most of these areas by modifying the rule or collecting additional

information. EPA did not address our recommendations regarding lead contamination and remedial actions at schools and child care facilities.

Background

Under the Safe Drinking Water Act, EPA is responsible for regulating contaminants that may pose a public health risk and that are likely to be present in public water supplies. EPA may establish an enforceable standard—called a maximum contaminant level—that limits the amount of a contaminant that may be present in drinking water. However, if it is not economically or technically feasible to ascertain the level of a contaminant, EPA may instead establish a treatment technique to prevent known or anticipated health effects. In the case of lead, EPA established a treatment technique—including corrosion control treatment—because the agency believed that the variability of lead levels measured at the tap, even after treatment, makes it technologically infeasible to establish an enforceable standard. EPA noted that lead in drinking water occurs primarily as a byproduct of the corrosion of materials in the water distribution system or household plumbing, some of which is outside the control of the water systems. Figure 1 illustrates the distribution system for drinking water and potential sources of lead contamination.

Figure 1: Water Distribution System from the Treatment Plant to Household Plumbing



Source: EPA.

EPA's lead rule also established a 15-parts-per-billion lead action level, which is based on the 90th percentile level of water samples taken at the tap. Water systems must sample tap water at locations that are at high risk of lead contamination, generally because they are served by lead service lines or are likely to contain lead solder in the household plumbing. The number of samples that must be collected varies depending on the size of

the water system and the results of earlier testing. Small or medium-sized systems whose test results are consistently below the action level may be allowed to reduce the frequency of monitoring and the number of samples collected.[7]

To determine their test results at the 90th percentile level, water systems must multiply the number of samples taken during a monitoring period by 0.9 and identify the result at that level, after ranking the results of the individual samples they collected in ascending order. For example, a water system required to take 50 samples would rank the results from 1 (for the lowest result) to 50 (for the highest result); the 90th percentile level is the 45th result, 5 below the highest test result for that monitoring period. When the 90th percentile results for a water system are above 15 parts per billion, the system has exceeded the lead action level and must meet requirements for public education and source water treatment. Under the public education requirements, water systems must inform the public about the health effects and sources of lead contamination, along with ways to reduce exposure. Source water responsibilities include, at a minimum, water monitoring to determine if the lead contamination is from the water source rather than—or in addition to—service lines or plumbing fixtures.[8]

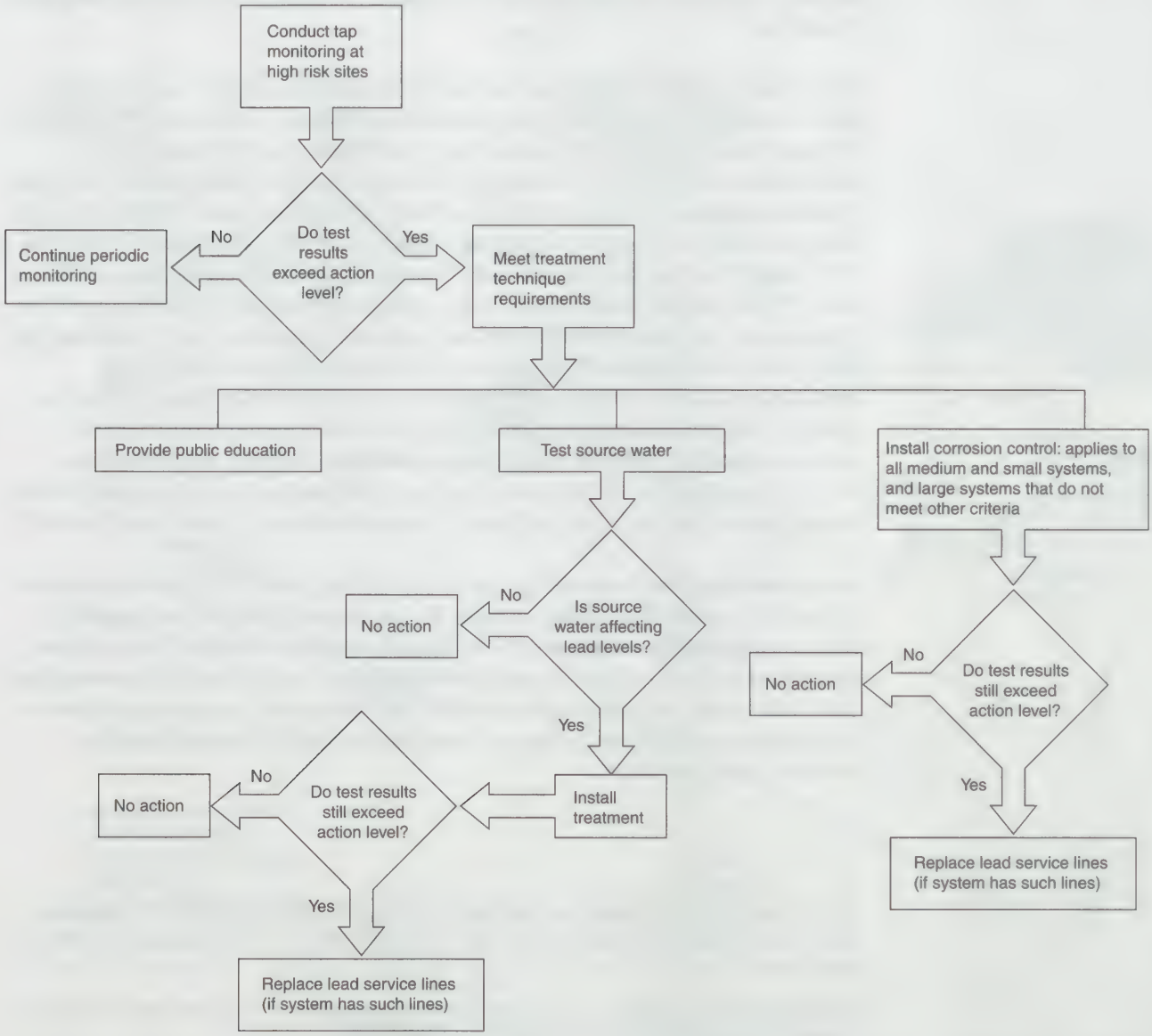
Water systems that exceed the action level may also be required to install corrosion control treatment, except for large systems that may qualify as having optimized corrosion control based on other criteria.[9] When either corrosion control or source water treatment are not effective in controlling lead levels, the lead rule calls for water systems with lead service lines to begin replacing them at a rate of 7 percent annually (unless the state requires a higher rate).

[7]In addition, all systems that have installed corrosion control treatment and consistently meet water quality control parameters specified by the state may also qualify for reduced monitoring.

[8]If testing indicates that the source water is contributing to elevated lead levels, then water systems may be required to install additional treatment.

[9]Large water systems exceeding the action level must install corrosion control treatment unless (1) they already had such treatment in place prior to the effective date of the lead rule and have conducted related activities equivalent to those specified in the lead rule or (2) they can demonstrate that their source water is minimally corrosive, thereby reducing the likelihood that lead will be introduced into the drinking water from corrosion of lead-bearing plumbing materials.

Figure 2: Process Drinking Water Systems Follow to Comply with EPA's Lead Rule



Source: GAO.

The states play an important role in ensuring that the lead rule is implemented and enforced at the local level. Among other things, they are responsible for (1) ensuring that water systems conduct required monitoring and (2) reporting the results to EPA. If the systems must take

corrective action to address elevated lead levels, the states are responsible for approving or determining the nature of the treatment or other activities that will be required, ensuring that they are implemented, and periodically reporting relevant information to EPA. The Safe Drinking Water Act authorizes the states to assume primary responsibility for enforcing the drinking water program—including the lead rule—if they meet certain requirements, such as adopting drinking water regulations at least as stringent as EPA's and having adequate procedures to carry out and enforce the program's requirements. All states except Wyoming have assumed primacy for managing their drinking water programs.

In addition to requiring the regulation of lead in public water supplies, the Safe Drinking Water Act also contains provisions to limit the extent to which materials in the water distribution system and household plumbing contribute to lead levels at the tap. Specifically, the act banned the use of solder and other materials in the installation or repair of public water systems or plumbing that are not lead-free. In this regard, the act established a material standard by defining "lead-free" to mean solders and flux containing no more than 0.2 percent lead, and pipes and pipe fittings containing no more than 8.0 percent lead.[10] In addition, the act called for development of voluntary performance standards and testing protocols for the leaching of lead from new plumbing fittings and fixtures by a qualified third party certifier or, if necessary, promulgated by EPA. A third party certifier set such a standard in 1997, limiting the amount of lead that the fittings and fixtures may contribute to water to 11 parts per billion.

To address the potential risks of lead contamination in water supplies serving schools and child care facilities, Congress passed the Lead Contamination Control Act of 1988.[11] Among other things, the act banned the manufacture and sale of drinking water coolers containing lead-lined tanks and other water coolers that are not lead-free and required (1) EPA to publish a list of such coolers and distribute it to the states, (2) the Consumer Product Safety Commission to issue an order requiring manufacturers and importers to repair or replace lead-lined coolers or recall and provide a refund for them, and (3) the states to establish programs to assist local agencies in addressing potential lead

[10]42 U.S.C. § 300g-6(d).

[11]42 U.S.C. § 300j-21 *et seq.*

contamination.[12] In 1990, EPA identified six models of water coolers from one manufacturer that contained lead-lined tanks, but the agency was unable to obtain information on the number of units produced. Regarding water coolers that were not lead-free, EPA identified three manufacturers that produced coolers containing lead solder that could contaminate drinking water. The manufacturers reported producing at least 1 million of the coolers.

Following the discovery of elevated lead levels in the District of Columbia's drinking water, EPA undertook a year-long evaluation to gain insight into how states and local communities are implementing the lead rule and to determine whether the problems identified in the District of Columbia are occurring elsewhere. EPA's activities included

- a series of expert workshops on key aspects of the rule (monitoring protocols, simultaneous compliance, lead service line replacement, public education, and lead in plumbing fittings and fixtures),
- a review of state policies and practices for implementing the lead rule,
- data verification audits that covered the collection and reporting of compliance data for the lead rule in 10 states, and
- an expert workshop and a review of state efforts to monitor for lead in drinking water at schools and child care facilities.

Participants in EPA's expert workshops included representatives of federal and state regulatory agencies, drinking water systems, researchers, public interest groups, and others.

[12]Coolers are considered "lead-free" if any parts or components that may come in contact with drinking water have no more than 8 percent lead or include solder, flux, or interior surfaces with no more than 0.2 percent lead. 42 U.S.C. § 300j-21(2).

Inadequate Data Impair EPA's Ability to Oversee Implementation of the Lead Rule

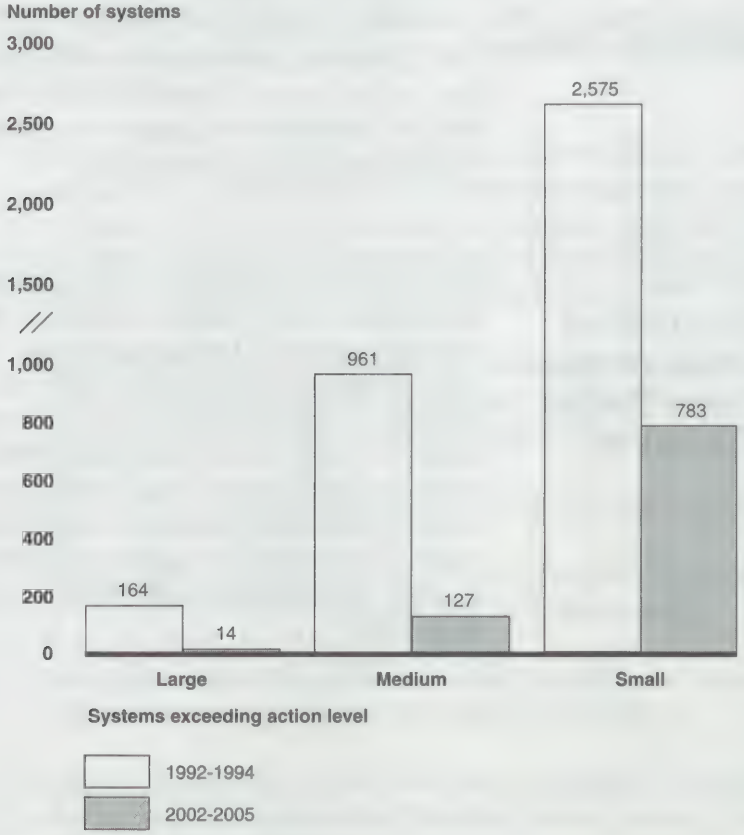
Although EPA's data on the results of testing indicate that the lead rule has largely been successful in reducing lead levels, the reporting of these data has not been timely or complete. In addition, key data on the status of water systems' efforts to implement the lead rule, including required corrective actions, are incomplete. EPA's data on lead rule violations are also questionable because of potential underreporting by the states. The lack of data on key elements of lead rule implementation makes it difficult for EPA and others to gauge the effectiveness of efforts to meet and enforce the rule's requirements.

Although EPA's Data Suggest a Decline in Lead Levels, States' Reporting on the Results of Lead Testing Has Not Been Timely or Complete

When the lead rule was first implemented, initial monitoring disclosed that several thousand water systems had elevated lead levels—that is, more than 10 percent of the samples taken at these systems exceeded the 15-parts-per-billion action level. EPA's most recent data indicate that the number of water systems that exceed the lead action level has declined by nearly 75 percent since the early 1990s. The systems that currently have a problem with elevated lead levels represent about 2 percent of all water systems and serve approximately 4.6 million people. Figure 3 shows the results (by system size) of the initial lead monitoring, conducted from 1992 to 1994, and more recent testing from 2002 through the quarter ending in June 2005.[13]

[13]EPA provided us with a data run as of August 9, 2005. According to EPA, these data represent, for the most part, compliance information reported through June 30, 2005; however, states may have made a limited number of additions or corrections to the data through the run date.

Figure 3: Number of Community Water Systems That Exceeded the Lead Action Level During the Initial Monitoring Period (1992-1994) and Their Most Recently Completed Monitoring (2002-June 2005), by System Size



Source: EPA.

Notes: (1) Figure 3 includes data on active community water systems in the 50 states and the District of Columbia. The size categories for the water systems are based on population served, with large systems serving populations of greater than 50,000, medium systems from 3,301 to 50,000, and small systems less than or equal to 3,300.

(2) Data for initial monitoring under the lead rule cover the period from 1992 to 1994 because the testing was phased in by system size. Large water systems began monitoring in January 1992, medium systems in July 1992, and small systems in July 1993.

(3) Many water systems have obtained approval to reduce the frequency with which they are required to monitor for lead from every 6 months to once a year or once every 3 years. Thus, to capture the most recent round of testing for all water systems, we included data from 2002 through June 2005, the most recent data available at the time of our analysis. A few small systems have received approval to reduce their monitoring to once every 9 years and may not be included in these statistics.

(4) Some water systems may have tested their lead levels multiple times during the periods covered in this analysis; however, we included only the results of the initial monitoring and the most recent test result for each system.

(5) We determined that the data are sufficiently reliable for the purposes of examining trends in lead action levels.

EPA, state, and water industry officials generally see the decline in the number of systems with elevated lead levels as evidence that the lead rule has been effective and point to corrosion control treatment as the primary reason. Another indicator of success is the number of water systems approved for reduced monitoring. Under the lead rule, water systems can obtain state approval to reduce both the frequency of monitoring and the number of samples included in the testing when test results show lead levels consistently below the action level. According to EPA's data, nearly 90 percent of all water systems have qualified for reduced monitoring.

After several years of experience with the lead rule, in January 2000, EPA made significant changes to the information states were required to report for inclusion in the agency's database. Among other things, EPA added a requirement for states to report, for large and medium-sized systems, all 90th percentile test results, not just the results for systems that exceed the action level. EPA said that it planned to use these test results to show how levels of lead at the tap have changed over time for large and medium systems and, by extrapolation, for small systems.

Although the new reporting requirements took effect in January 2002, EPA's database contained 90th percentile test results for only 23 percent of the large and medium systems by January 2004.[14] EPA officials explained that states were still having difficulty updating their information systems to accommodate the new reporting requirements and, for EPA, obtaining the data was not a priority at that time. Following the detection of elevated lead levels in the District of Columbia, however, EPA made a concerted effort to obtain more complete information from the states, and, as of June 2004, EPA reported that it had data for nearly 89 percent of the large and medium systems (based on an analysis of test results submitted from January 2000 through May 2004). However, we also analyzed data on the results of lead testing and found that EPA's database does not contain current information for a much larger percentage of large and medium water systems. Specifically, we found that for the period from January 2002

[14]EPA issued minor revisions to the lead rule, including changes to the reporting requirements, in January 2000. While the revisions generally took effect as of April 2000, one exception was the reporting requirements. Although states were encouraged to begin meeting the new requirements sooner, they did not officially take effect until January 2002. See 65 Fed. Reg. 1991 (Jan. 12, 2000).

through June 2005, EPA's database lacks any test results for nearly 31 percent of the large and medium water systems.[15] We could not determine whether the data are missing because states have not reported the results or because testing has not occurred. When asked whether states have been updating test results in a timely manner since 2004, an official representing EPA said that the timeliness of recent test data is unknown; the agency has not been tracking whether states are adequately maintaining data on the results of lead testing.

Regarding the information required for small water systems—which is limited to test results exceeding the action level—officials from both the Office of Ground Water and Drinking Water and the Office of Enforcement and Compliance Assurance indicated that some data are probably missing but could not provide specific estimates. An official from the Office of Ground Water and Drinking Water commented that EPA's database likely includes most of the required small system data because action level exceedances trigger follow-up activities and states are more likely to pay attention to those cases.

EPA Does Not Have Complete Information on the Status of Water Systems' Efforts to Implement Lead Rule

As part of EPA's efforts to improve its indicators of lead rule implementation, the agency restructured its reporting requirements and reduced the number of "milestones" that states are required to report from 11 to 3. EPA established three corrective action milestones, including (1) a DEEM milestone, meaning that the system is deemed to have optimized corrosion control; (2) an LSLR milestone, meaning that the system is required to begin replacing its lead service lines; and (3) a DONE milestone, meaning that the system has completed all applicable requirements for corrosion control, source water treatment, and lead service line replacement.[16]

[15]Our analysis included active community water systems. Of the water systems lacking data, 157 are large and 2,457 are medium-sized systems.

[16]For the purposes of this report, we are using the term "corrective action milestones" although, in some instances, water systems can be reported as meeting a milestone without taking or completing a corrective action. For example, water systems do not necessarily have to install treatment to be deemed to have optimized corrosion control. They may be eligible for a DEEM designation because their lead levels are consistently low or they can demonstrate that they have minimally corrosive water.

EPA officials told us that the vast majority of water systems should have at least one milestone in the database. They indicated that in most instances, systems should have a DEEM designation because they have installed corrosion control or qualify for meeting the milestone otherwise. However, we found that, overall, EPA has information on corrective action milestones for only 28 percent of the community water systems nationwide—and lacks any milestone data on the remaining 72 percent. Table 1 summarizes the results of our analysis.

Table 1: Corrective Action Milestone Data Reported by the States through June 2005, by System Size and Type of Milestone[a]

		Systems without any milestone data		Systems with milestones				
							Total systems with one or more milestones[c]	
System size	Number of water systems	Number	Percent	DEEM[b]	LSLR	DONE	Number	Percent
Large	841	600	71.3	202	7	206	**241**	**28.7**
Medium	7,620	5,335	70.0	2,122	15	1,850	**2,285**	**30.0**
Small	42,991	31,195	72.6	11,254	21	8,838	**11,796**	**27.4**
Total	**51,452**	**37,130**	**72.2**	**13,578**	**43**	**10,894**	**14,322**	**27.8**

Source: GAO analysis of EPA data.

[a]This table reflects the milestone data that states reported for active community water systems.

[b]In the case of the DEEM milestone, states are required to report the basis for their determinations that systems have optimized corrosion control and EPA established three reason codes for that purpose. We found that EPA's database contained the required reason codes for 100 percent of the 13,578 systems with a DEEM milestone.

[c]Because individual water systems may have multiple milestones in EPA's database, this column represents the number of unique systems with one or more milestones to avoid "double counting."

The extent to which milestone data were reported to EPA varied from state to state. We found that 22 states had not reported milestones for any of their water systems and another 8 states had reported data on about 10 percent of their systems. (See app. II for a state-by-state breakdown of reported milestone data.)

EPA officials believe that most water systems have actually taken the steps necessary to meet the criteria for the DEEM milestone, at a minimum, and attribute the lack of milestone data to non-reporting by the states rather than noncompliance by the water systems. They also suggested that some of the 22 states we identified as having reported no milestone data, based on our analysis of EPA's current data, may have reported corrective actions

prior to 2000, when EPA modified the number and type of milestones. However, we reviewed archived data in EPA's database and found that 8 of the 22 states had also not reported any milestones prior to 2000, and another 11 states had reported data on no more than 10 percent of their systems. Overall, the 50 states had reported milestone data for only 5.7 percent of their community water systems prior to 2000.

Moreover, some information in EPA's database is inconsistent with other reported data. Specifically, we found differences between the information on lead service line replacement in EPA's database—systems having an LSLR milestone—and the information states reported in the agency's 50-state review of lead rule implementation policies and practices. As table 2 shows, seven states reported requiring lead service line replacement in response to EPA's June 2004 query but did not have any LSLR milestones in EPA's database in the same time frame.

Table 2: Differences in Reported Information on Lead Service Line Replacement, as of June 2004

States reporting required lead service line replacement activity in EPA's June 2004 information request[a]	States reporting LSLR milestone in EPA's database as of June 2004[b]
Arizona	
Connecticut	
Illinois	Illinois
Iowa	
Massachusetts	Massachusetts
Michigan	
Minnesota	Minnesota
Montana	Montana
New York	
Pennsylvania	Pennsylvania
Utah	
Wisconsin	
	Virginia
12 states	6 states

Source: GAO analysis of EPA data.

[a]In response to EPA's information request, 11 states reported that some water systems were voluntarily replacing lead service lines—or, in two instances, the "goosenecks" connecting the water main to a service line. The 11 states included one state (Michigan) that also reported requiring one or more systems to replace lead service lines.

[b]The District of Columbia was also identified in EPA's database with an LSLR milestone.

In addition, after following up with state officials, we found that EPA's database did not contain accurate data on the number of water systems required to replace lead service lines because the states were not providing timely updates or correcting erroneous information.

Data on Lead Rule Violations Are Questionable Because of Potential Underreporting by the States

Periodic audits by EPA—and our own analyses—raise questions about the completeness of EPA's data on lead rule violations. To assess the reliability of its drinking water data, EPA regularly conducts data verification audits that evaluate state compliance decisions and the adequacy of states' reporting to the national database. In addition, EPA prepares a national summary evaluation of the reliability of drinking water data every 3 years. While past data verification audits have not assessed compliance decisions under the lead rule, to the extent that states' reporting practices are relatively consistent across regulations, the audits may shed some light on the types of problems likely to be found in the reporting of lead rule data. According to the most recent national summary of data reliability,[17] which covered audits conducted from 1999 to 2001, the estimated error rate for health-based violations—involving maximum contaminant level or treatment technique requirements—was 35 percent, down from 60 percent in the prior national report, which covered audits conducted from 1996 to 1998. For monitoring and reporting violations, the estimated error rate was 77 percent, down from 91 percent in the prior report. The March 2004 report said that most violation errors resulted from incorrect compliance determinations by the states, meaning that the state should have cited a violation but did not. Other problems included "data flow" errors (when the state correctly identified a violation but did not report it to EPA) and errors in EPA's database (such as violations that were incorrectly reported or not removed when rescinded).

Another analysis from EPA's March 2004 report did include the lead rule and the results also raise questions about the completeness of EPA's data on lead rule violations. The report states that by means of a tool that tracks the number of violations reported in each state over a period of several

[17]EPA, *Drinking Water Data Reliability Analysis and Action Plan (2003)*, EPA 816-R-03-021 (Washington, D.C., March 2004). The report's estimates of data quality have an 80 percent confidence level and a 7.5 percent margin of error.

years, EPA determined that 14 states had not reported any treatment technique violations under the lead rule during a 6-year period from 1997 to 2002.[18] The report noted that this potential non-reporting should be evaluated further and recommended that EPA and the states conduct annual evaluations of all instances of potential non-reporting. EPA's Office of Ground Water and Drinking Water asked the regional offices to follow up with the states regarding the potential underreporting, as recommended in the March 2004 report on data reliability. For the most part, however, the regions' responses did not address the lack of treatment technique violations under the lead rule in the applicable states; two of the regional offices did not provide written responses. Officials from EPA's Office of Enforcement and Compliance Assurance were not aware of the violations analysis. The officials told us that because of limited resources, they focus their efforts on helping to ensure that states address the worst compliance problems—water systems identified as significant noncompliers as a result of the frequency or severity of their violations.

A lack of violations—or a relatively low number of water systems with violations—does not necessarily mean that states are not meeting reporting requirements, or that their compliance monitoring and enforcement efforts are inadequate. However, analyzing the violations data and following up on the results could provide some useful insights into the reasons for differences among the states; it could also help identify problem areas and best practices. We updated EPA's analysis of violations and, as table 3 shows, the percentage of water systems that have had one or more violations over the past 10 years varies from state to state, particularly in the case of monitoring violations.

[18]EPA includes several types of violations in its treatment technique category, including failure to install optimal corrosion control treatment, failure to meet water quality control parameters, failure to replace lead service lines, and failure to meet public education requirements, among other things.

Table 3: Percentage of Systems with Violations from 1995 to June 2005[a]

Monitoring violations		Treatment technique violations	
Percent of systems with violations[b]	Number of states	Percent of systems with violations[b]	Number of states
0	1	0	11
> 0 to 5	10	> 0 to 1	16
> 5 to 10	6	> 1 to 5	14
> 10 to 20	11	> 5 to 10	6
> 20 to 30	9	> 10	3
> 30 to 40	7		
> 40	6		
Total	**50**	**Total**	**50**

Source: GAO analysis of EPA data.

[a]We used 1995 as the starting point for our analysis because all water systems should have completed their initial monitoring by the end of 1994.

[b]Some water systems in EPA's database have multiple violations. To avoid double counting, we identified the percent of unique systems with one or more violations.

Appendix III contains a state-by-state analysis of lead rule violations reported from 1995 to June 2005.

More recently, EPA conducted data verification audits during the fall of 2004, which focused exclusively on states' compliance determinations under the lead rule in five states and included the lead rule as part of the audit in another five states. However, the results are not yet available. EPA officials have been analyzing the data and obtaining comments on the preliminary findings from the states; they expect to issue a final report by the end of calendar year 2005.

Lack of Data Affects EPA's Ability to Evaluate the Effectiveness of Lead Rule Implementation and Enforcement

In changing its reporting requirements in January 2000, EPA recognized that it needed better indicators of the lead rule's implementation. Regarding the 90th percentile results of lead monitoring, EPA noted that in terms of routine reporting, these data are the only measure it has for showing the lead rule's effectiveness and said that, without such data, the agency would have no way to measure progress.[19] Similarly, EPA

[19]65 Fed. Reg. 1991 (Jan. 12, 2000).

maintained that having information on water systems' corrective action milestones, along with quarterly violation and follow-up information, would provide data on the status of lead rule implementation and allow the targeting of compliance and enforcement activities.[20] Given the reduced number of milestones, EPA indicated that it would be critical for states to report the information completely and in a timely manner, and that the agency would be following up with the states to ensure that such reporting was occurring.

Despite the importance of the 90th percentile results and corrective action milestones to evaluating the lead rule's implementation, our analyses confirmed or identified significant and longstanding gaps in the amount of information available. Although EPA attempted to ensure that it had complete data on the results of lead testing, following the publicity surrounding the incidence of lead contamination in the District of Columbia, the problems with incomplete test result data have continued and the agency has not followed up on the missing milestone data. EPA has also been slow to take action on the potential underreporting of violations. As noted earlier, following its March 2004 report on data reliability, EPA did not determine the reasons for the lack of violations reported by some states. EPA's previous summary evaluation, which was issued in October 2000, identified similar indications of underreporting and called for targeted attention to the applicable states and regions to address the issues and develop action plans.[21]

EPA needs complete, accurate, and timely data to monitor water systems' progress in implementing the lead rule, identify potential problem areas and best practices, and take appropriate action. In particular, not having complete or reliable data on corrective action milestones or violations makes it difficult to assess the adequacy of EPA and state enforcement efforts. However, officials from EPA's Office of Enforcement and Compliance Assurance told us that the amount of enforcement resources devoted to the drinking water program—including enforcement of the lead rule—has declined in recent years. They also told us that while they hold monthly meetings with their counterparts in EPA's regional offices and

[20]63 Fed. Reg. 20043 (Apr. 22, 1998).

[21]EPA, *Data Reliability Analysis of the EPA Safe Drinking Water Information System/Federal Version (SDWIS/FED)*, EPA 816-R-00-020 (Washington, D.C.: Oct. 2000). EPA found that from 1993 to 1998, 1 state had not reported any lead monitoring violations and 21 states had not reported any treatment technique violations related to the lead rule.

state officials to discuss the more significant violators, the officials have not systematically evaluated state enforcement efforts with regard to the lead rule. See appendix IV for information on EPA and state enforcement actions, by type, from 1995 to June 2005.

EPA and state officials attribute the problems with lead rule data to the complicated nature of the rule, the incompatibility of EPA and state information management systems, and resource constraints. For example, EPA officials noted that it is difficult to ensure that the database contains complete information—and includes data on every system that is required to test for lead in a particular period—because the frequency of required testing can vary depending on whether a system has qualified for reduced monitoring (and maintains that status in future periods). The same circumstances also make it difficult to develop trend data. EPA and state officials indicated that the January 2000 minor revisions to the lead rule, which made significant changes in states' reporting requirements, exacerbated existing problems with the transfer of accurate and timely data from the states to EPA. For that and other reasons, modifying the states' data systems to incorporate the new reporting milestones has been delayed. In addition to problems with the structure of the information systems—and technical problems in actually transferring data from the states to EPA—EPA and state officials acknowledge that reporting water systems' milestone data has been a low priority. The officials explained that since January 2004, states have been focusing their limited resources on reporting the 90th percentile test results for large and medium water systems.

EPA and the Association of State Drinking Water Administrators have been working on a Safe Drinking Water Information System modernization effort that should address at least some of current data problems, according to EPA officials. Among other things, the modernization will make it easier to transfer data between states and EPA so EPA's data will be more timely. To improve the accuracy of the data, EPA's system will have a component designed to validate state data before it is entered into the federal database. As of October 2005, EPA had completed the transition to its modernized system for the entry of new data.

Weaknesses in the Regulatory Framework for the Lead Rule May Undermine Public Health Protection

Based on their experiences in implementing the lead rule, EPA, state, and water system officials have identified six aspects of the rule for which oversight could be improved or the requirements modified to increase public health protection. Specifically, their experiences indicate that (1) the sampling sites used for lead testing may no longer reflect areas of highest risk, (2) reduced monitoring may not be appropriate in some instances, (3) the homeowners who participate in tap monitoring may not be informed of the test results, (4) controls over when and how treatment changes are implemented may not be adequate, (5) data on the effectiveness of lead service line replacement programs are limited, and (6) states vary in how they apply the lead rule when water systems sell drinking water to other systems. In addition, some of the officials responsible for implementing the lead rule and other drinking water experts believe that existing standards for plumbing fixtures may be outdated. EPA is considering modifications to the lead rule that will address some of the problems we identified.

Sampling Sites May No Longer Reflect Areas of Highest Risk

Under the lead rule, water systems must select sampling sites that are considered to be at high risk for contamination. The rule defines Tier 1 sites as single-family structures served by lead service lines, and/or containing lead pipes (or copper pipes with lead solder installed after 1982).[22] According to participants in EPA's workshop on monitoring protocols and state officials we interviewed, one problem is that EPA has never updated its site selection criteria and at least one of the criteria is outdated. Specifically, enough time has elapsed so that lead solder in plumbing installed from 1983 to 1986 is no longer "fresh" (lead solder was banned in 1986). Experts believe that, by now, solder from that period has been coated by a naturally occurring film that prevents lead leaching. Moving the sampling sites to other Tier 1 locations—for example, homes served by lead service lines—could be problematic. In the preamble to the lead rule, issued in 1991, EPA cited a survey by the American Water Works Association which estimated that only about 20 percent of the nation's community water systems have lead service lines. Moreover, although the lead rule required water systems to do a "materials evaluation" to identify an adequate pool of high risk sampling sites, according to EPA the

[22]If a water system does not have a sufficient number of Tier 1 sites in its sampling pool, the system may use Tier 2 sites, which are buildings (including multi-family residences) that meet the Tier 1 criteria. If necessary, the system may obtain samples from Tier 3 sites, which are single-family structures that contain copper pipes with lead solder installed before 1983.

evaluation did not assess pipe materials system-wide, and many systems do not have a complete inventory of their service lines.

A related problem is that sampling locations have likely changed over time as sites are no longer available or appropriate, and states may not have procedures in place to ensure that these locations continue to represent the highest risk sites.[23] In this regard, EPA requested information from the states on how they "ensure that site locations were correctly followed during system sampling rounds." As table 4 shows, a significant number of states may not be tracking changes in water systems' sampling locations.

Table 4: State Activities to Ensure that Water Systems Are Taking Lead Samples at Appropriate Sites

Activity	Number of states
State uses tracking mechanisms such as special forms or unique codes to control sampling sites	14
State reported a less rigorous or less defined means of oversight[a]	11
State requires notification when systems change sampling locations but does not otherwise track sampling	5
State does not review or track sampling[b]	8
State did not answer question or provided information that was nonresponsive	12

Source: GAO analysis of EPA's information request on state implementation policies and practices.

[a]For example, some states reported comparing the actual sampling locations with the sampling plans, some said that they advise their systems to continue sampling at the locations used during the initial sampling rounds, and others reported "reviewing" each round of sampling but did not mention comparing the sites to the sampling plans.

[b]Two of these states (California and Vermont) reported that they lacked the resources to ensure that their water systems are taking samples at the correct locations.

Another uncertainty is whether systems that are on reduced monitoring—and have been allowed to reduce the number of samples they collect—are taking samples from locations that represent the highest risk sites based on

[23]For example, homeowners may drop out of the sampling program, homes may be torn down or become vacant, or homeowners may install water softeners or other treatment devices that reduce lead levels.

previous testing.[24] According to the lead rule, these water systems must take their samples from sites included in the pool of high risk sampling sites identified initially. Although the systems have some indication of which sites within the pool have historically tested at higher or lower lead levels, the rule is silent on how sites within the pool are to be selected for reduced monitoring, except that they must be "representative" of the sites required for standard monitoring. In addition, the rule provides that states may specify the sampling locations. EPA requested information from the states on what role they play in selecting the sites used for reduced monitoring. We analyzed the states' responses and found that, in most instances, the states' role is limited; table 5 summarizes the results of our analysis.

Table 5: State Role in Selecting Sites for Reduced Monitoring

Activity	Number of states
State requires that highest risk sites, based on previous test results, are selected	3
State policy ensures that some of the highest risk sites, based on previous test results, are selected[a]	9
State provides general guidance and may review the water systems' selections[b]	19
State plays no role in selecting sites for reduced monitoring	12
State did not answer question or provided information that was nonresponsive	7
Total	**50**

Source: GAO analysis of EPA's information request on state implementation policies and practices.

[a]Among other things, some states require systems to select every other sampling site after ranking the sites by result from prior testing or alternate sites in each round of sampling.

[b]For example, many of these states instruct their water systems to focus on Tier 1 sites first (if their sampling pool also contains Tier 2 or Tier 3 sites) or say that the sites must be representative of those in the pool or of the distribution system.

[24]Under the lead rule, systems that qualify for reducing the frequency of monitoring because of consistently good test results may also reduce the number of samples they test (and accordingly, the number of locations from which they collect samples). Except for the smallest systems, which serve populations of 100 or fewer (and are only required to take 5 samples), water systems can cut the number of samples they collect by half. This means, for example, that the largest systems, serving populations of over 100,000, can reduce the number of sampling locations from 100 to 50.

Reduced Monitoring May Not Be Appropriate in Some Instances

According to EPA's lead rule, small and medium-sized water systems whose test results are consistently at or below the action level may reduce the frequency of monitoring from once every 6 months to annually and, if acceptable results continue, to once every 3 years.[25] In addition, systems of any size that operate within water quality control parameters reflecting optimal corrosion control treatment, as specified by the state, may reduce the frequency of monitoring under the same schedule.[26] The rule also lays out conditions under which water systems must return to standard monitoring—for example, small and medium-sized systems that have exceeded the action level. In addition, states have the flexibility to require systems to resume standard monitoring if the state deems it to be appropriate.[27] We analyzed EPA's compliance data and found some instances that raise questions about the states' decisions to allow reduced monitoring. Specifically, we found that 49 large and medium water systems were exceeding the 15-parts-per-billion action level and appeared to be on reduced monitoring schedules.[28] In addition, our analysis indicates that 104 large and medium systems with lead levels of 13-15 parts per billion also appear to be on reduced monitoring schedules. Although this is allowable under EPA's regulations, according to some state officials, systems with lead levels just below the action level should be subject to closer scrutiny and, thus, may not be good candidates for reduced monitoring.

To determine how states exercised their discretion with regard to monitoring frequency, we reviewed their responses to EPA's information

[25]Specifically, if the test results are at or below the action level in two consecutive 6-month monitoring periods, the systems may reduce the frequency of monitoring to once a year. Further, systems that test below the action level in three consecutive annual monitoring periods may be allowed to conduct testing only once every 3 years. Small systems may be eligible to reduce their monitoring frequency to once every 9 years if (1) they can demonstrate that their distribution system, service lines, and drinking water supply plumbing (including the plumbing conveying drinking water within all residences and other buildings connected to the system) is lead-free and (2) all applicable test results do not exceed 5 parts per billion at the 90th percentile.

[26]When systems install corrosion control treatment, states must evaluate tap and water quality parameter samples to determine whether the system has properly installed and operated the treatment.

[27]When systems submit new monitoring or treatment data, or when other relevant data become available, states are required to review and, where appropriate, revise their determinations.

[28]In analyzing these data, we compared the most recent test results reported during the 2002 to June 2005 time frame and data on water systems' current monitoring frequency.

request, which asked the states to describe how they determine if reduced monitoring is appropriate. According to their responses, the states by and large adhere to the requirements of the lead rule and allow reduced monitoring whenever a water system's test results are at or below the action level in consecutive monitoring periods.[29] Specifically, 40 states reported that they follow the federal regulation, 6 states indicated that they may be using some additional criteria for their reduced monitoring determinations,[30] and 4 states did not answer or provided information that was nonresponsive. EPA did not ask for the states' views on whether reduced monitoring is appropriate when a water system's test results are at or just below the action level or on circumstances in which states might determine that previously approved reduced monitoring is no longer appropriate—and the states did not volunteer such information. None of the states reported using other criteria, such as test results that are at or just below the action level, to delay or rescind approval for reduced monitoring.

A key issue is whether water systems should be required to resume standard monitoring following a major treatment change so that the potential effects of the change can be evaluated. Given the circumstances in which lead contamination became a problem in the District of Columbia, when a change in the system's disinfection treatment impaired the effectiveness of corrosion control, such decisions can be critical. In its information request on state implementation policies and practices, EPA asked the states whether they had ever required a system to conduct more frequent monitoring to evaluate the potential effects of a treatment change. It would have been useful to know more about the states' policies and practices in this regard, including how often the states required additional monitoring and the criteria they used in making such determinations.

[29]Although the lead rule states that test results must "meet" the action level (i.e., be at or below the action level) for a water system to be eligible for reduced monitoring, 10 states reported that reduced monitoring is allowed only when the test results are "below" the action level. We did not follow up with these states to determine whether they actually differ from the federal rule or their response was in error.

[30]In some of these instances, the states' responses implied—but did not specify—additional criteria. Otherwise, two states (Louisiana and South Dakota) reported that water systems would be approved for triennial monitoring if their 90th percentile test results were less than half of the action level. Michigan limits reductions in the number of sampling locations in the case of "combined distribution systems," in which systems that purchase water are interconnected with a water wholesaler.

However, EPA's question was limited in scope and, as table 6 shows, the states often did not elaborate.

Table 6: States That Require More Frequent Monitoring to Evaluate the Effects of Treatment Changes

State policy	Number of states
States answered yes without elaborating on the frequency of—or criteria for—such decisions	11
States answered yes and included some indication of how often they required additional monitoring (7 states) or the criteria used for these decisions (5 states)[a]	12
State answer was ambiguous; it is unclear whether state has ever required more frequent monitoring after a treatment change[b]	7
States answered no, generally without elaboration[c]	16
States did not answer question or provided information that was nonresponsive[d]	4
Total	**50**

Source: GAO analysis of EPA's information request on state implementation policies and practices.

[a]For example, two states indicated that requiring more frequent monitoring was relatively common, while others reported that it was required in certain instances or occasionally. Examples of criteria for more frequent monitoring include (1) test results following a treatment change that are close to the lead action level and (2) installing treatment that is designed or expected to change water quality.

[b]Responses from these states referred to state regulations or policy (e.g., "this is embedded in the approval process") but did not directly answer the question of whether the state had ever required a system to conduct more frequent monitoring. In several instances, it seems likely that water systems have been required to monitor following a treatment change.

[c]Several states indicated that additional monitoring was recommended or encouraged following a treatment change but not required.

[d]Two states did not answer the question and the responses from the other two states only addressed monitoring requirements following changes to corrosion control treatment.

In our discussions with 10 states, we found a variety of policies and practices regarding reduced monitoring. For example, officials from California and New York told us that they do not approve reduced monitoring—or are reluctant to do so—when water systems' test results are close to the lead action level. On the other hand, Connecticut and Massachusetts officials indicated that they have systems that are on reduced monitoring despite test results close to the action level. Several

other states indicated that, in the case of large water systems, approval for reduced monitoring is linked to whether the systems are meeting their water quality parameters—not the results of lead monitoring. On the issue of monitoring following a major treatment change, some participants at EPA's monitoring workshop stated that standard compliance monitoring does not adequately evaluate the impact of treatment changes and that monitoring immediately after major changes should be required. Several of the states we contacted also favor increased monitoring under these circumstances; Florida and New York, for example, require systems to return to semi-annual monitoring following a treatment change. Pennsylvania officials agree that the state and water system should revisit the treatment approach when monitoring results indicate that a treatment change is affecting water chemistry. However, the officials acknowledged that they may not find out about the impact of treatment changes in a timely manner when water systems are on a triennial monitoring schedule.

Homeowners Who Participate in Periodic Tap Sampling May Not Be Notified of the Test Results

According to EPA's information request on state implementation policies and practices, only two states require their water systems to notify homeowners of the results of lead testing—Texas (only when results exceed the action level) and Wisconsin. At least 17 other states indicated that notification may be occurring voluntarily to varying degrees. Table 7 summarizes the results of our analysis.

Table 7: State Views on Extent to Which Water Systems Are Notifying Homeowners of the Results of Lead Testing

Extent of notification	Number of states
All systems notify homeowners	1
Some systems notify homeowners[a]	15
Test results are provided only on request	2
State is not aware of any systems that notify homeowners	6
State does not know what systems are doing[b]	18
State apparently misinterpreted EPA's question[c]	8
Total	**50**

Source: GAO analysis of EPA's information request on state implementation policies and practices.

[a]The states' answers varied considerably. For example, some states indicated that their larger water systems are providing results to homeowners and some indicated that homeowners got the results only if they exceeded the action level.

[b]In a few instances, the states indicated that they recommended that their water systems provide homeowners with test results. For example, Hawaii recommends notifying the homeowner if test results exceed 100 parts per billion, both to alert the homeowner and to verify that the sampling protocol was followed correctly. However, the states in this category did not have information on whether homeowners were actually getting test results.

[c]EPA asked if water systems provide homeowners with the lead sampling results derived from "any volunteer sampling program." Based on their answers, it appears that these states may have believed that EPA was asking about any testing above and beyond the regular sampling program involving residential tap samples. For example, several states said that they were not aware of any systems performing volunteer sampling programs and others indicated that their systems will conduct lead testing for homeowners on request.

Controls over When and How Treatment Changes Are Implemented May Not Be Adequate

In some instances, changes to other treatment processes can make corrosion control less effective. According to EPA, state, and industry officials, one of the biggest challenges in implementing the lead rule is achieving "simultaneous compliance" with other rules, including, in particular, rules related to total coliform bacteria, surface water treatment, and disinfection by-products. Changing the type of disinfectant a system uses to control bacteria, for example, can impair the effectiveness of a system's corrosion control treatment to prevent lead contamination. Among other things, states assuming primary enforcement responsibility must have a process for ensuring that the design and construction of new or substantially modified water system facilities will be capable of meeting drinking water regulations, including the lead rule.[31] In addition, in its minor revisions to the lead rule, EPA added a requirement that certain water systems must notify the state no later than 60 days after making a change in water treatment.[32] However, the responses to EPA's information request raise questions about the nature and extent of states' reviews of treatment changes. On the one hand, 31 states indicated that they had some type of proactive process to review or evaluate treatment changes, before or after the treatment was installed, including 15 states that reported requiring some or all of the affected water systems to provide information on the potential effects of treatment changes on corrosion control.[33] On the

[31]40 C.F.R. § 142.10(b)(5).

[32]40 C.F.R. § 141.90(a)(3).

[33]Information provided by the remaining 19 states was unclear, generally because their responses were limited or based on a literal interpretation of EPA's question (e.g., states responded "in writing," when asked how systems notified the state about treatment changes).

other hand, it appears that in at least 15 states, the plan review process may be limited, or the states may not be receiving notifications from all their water systems. For example, some states indicated that their review process only covers changes to a system's physical infrastructure—or specifically excludes changes in the chemicals used in a process. Other states reported that they are not learning of some treatment changes until they conduct comprehensive inspections of the water systems, or that small systems in particular are not notifying the state when they change their treatment processes.

Some of the participants in EPA's May 2004 workshop on simultaneous compliance cited a need for additional regulations or guidance to help ensure that the effectiveness of corrosion control is maintained when water systems make changes to other treatment processes. For example, some participants suggested that the lead rule should better define or even specify the types of treatment changes that (1) should be reported to the state and (2) trigger additional monitoring or analysis. Along those lines, Washington state officials told us that certain changes, such as switching the disinfectant from chlorine to chloramines or making adjustments that affect the water's pH or alkalinity, may warrant closer review because of the potential impact on corrosion control. The officials also noted that additional guidance from EPA on these matters would be helpful. Others believe that small water systems, in particular, need more guidance on the potential effects of various treatment changes, and that operator certification and training programs should be updated to address these topics.

Data on the Effectiveness of Lead Service Line Replacement Programs Are Limited

Under the lead rule, drinking water systems may be required to replace lead service lines if test results exceed the action level after installing corrosion control and/or source water treatment. Some of the participants in an EPA workshop on lead service line replacement and state officials we contacted raised questions about the effectiveness of replacement programs, in part because such programs often result in partial replacement only. Water systems are responsible for replacing only the portion of the service lines they own. While residential customers may, at their option, pay the cost of replacing the rest of the service line—typically, the portion running from the curb stop or property line to the household plumbing system—some evidence suggests that customer participation in such programs is generally low.

According to workshop participants, little conclusive information is available on the extent to which removing lead service lines lowers lead levels at the tap. In a survey of water systems conducted for the American Water Works Association, 18 of 27 respondents indicated that lead service lines were not responsible for the highest levels of lead in drinking water, and 20 of 29 respondents reported no observed linkage between lead service lines and lead levels in drinking water.[34] However, the survey did not include information on test results before and after replacement of lead service lines. The American Water Works Association Research Foundation is sponsoring a study of the relative contributions of service lines and plumbing fixtures to lead levels at the tap; the projected completion is fall 2008.

The limited data on the extent and results of lead service line replacement programs make it difficult to draw conclusions about the programs' effectiveness or the need for additional regulations or guidance. As noted earlier, EPA's data on corrective action milestones—including the LSLR milestone—are incomplete. Moreover, few states reported requiring systems to replace lead service lines in response to EPA's information request on state implementation policies and practices. Specifically, when asked if they have any systems that have been required to do lead service line replacement, five states answered "yes" without elaborating and seven states reported a total of 27 water systems that are (or were) replacing lead lines.[35] In addition, although the lead rule requires testing following partial service line replacement, it appears that neither the states nor EPA are collecting and analyzing these test results. EPA asked states to describe the process they use to ensure that water systems are following the requirements for lead service line replacement. Among other things, the lead rule requires systems to collect samples within 72 hours following partial replacement and to notify homeowners and occupants of the results. States may waive the requirement that these test results also be provided to the states. Of the 12 states that reported requiring one or more water systems to replace lead service lines, only one indicated that its

[34]Overall, 65 water systems with lead service lines were included in the survey. Although a total of 41 systems responded to the survey, the number of responses to individual questions varied.

[35]In addition, nine states reported that one or more of their water systems were replacing lead service lines voluntarily (including one state that also reported requiring systems to replace lead lines). Two more states reported that systems with lead goosenecks, which connect water mains to the service lines, have either replaced the goosenecks or are doing so as they are discovered.

water systems might be required to report the results of service line testing to the state.[36]

Some of the officials we contacted raised concerns about whether the benefits of replacement are enough to justify what can be a significant investment. For example, Iowa drinking water officials commented that partial replacement is not a good use of resources because it disturbs the line, releasing lead particulate matter into the water, and still leaves half the lead line in place. In addition, officials from the Syracuse Water Department told us that they are planning to replace lead service lines at a cost of $5.3 million, although they are skeptical that the effort will significantly reduce lead levels, citing the age of the housing stock and lead contributions from internal residential plumbing. The officials attribute the city's problem with elevated lead levels to a simultaneous compliance issue. Specifically, adding a phosphate-based corrosion inhibitor to further reduce the corrosiveness of the drinking water solves one problem but creates another: excessive phosphates in the system's discharges to a local lake.

Participants at EPA's workshop on lead service line replacement and some of the state and water industry officials we contacted suggested measures to help ensure that water systems maximize the potential benefits of replacement efforts. For example, some workshop participants called for EPA guidance on strategies to encourage full service line replacement and motivate customers to have their portion of the line removed. Such strategies might include subsidizing a portion of the replacement cost, offering low interest loans or property tax relief, requiring disclosure of lead service lines in property sales, or providing more information on the health effects of exposure to lead in drinking water. Others suggested that prioritizing the replacement of lead service lines would help ensure that replacement activities focus on the populations most at risk from exposure to elevated lead levels. Some utilities are already prioritizing service line replacement using criteria such as locations with vulnerable populations, including schools and child care facilities, locations where test results have exceeded the action level, and lines serving 20 or more people in an 8-hour day.

[36]Another two states said that they issued regulations or provided guidance instructing systems to comply with the testing requirements; three states indicated that they review a system's replacement program during periodic inspections; and six states did not provide any information regarding their oversight of lead service line testing.

States Vary in How They Apply the Lead Rule When Water Systems Sell Drinking Water to Other Systems

We found some differences among the states in how interconnected water systems—generally comprising a system that sells drinking water along with one or more systems that buy the water—are required to monitor for lead and report the results. According to EPA's proposed definitions, these interconnected water systems are known as "combined water distribution systems."[37] The variations in state implementation practices create differences in the level of public information and, potentially, public health protection. Combined distribution systems account for a large and growing share of the nation's community water systems so differences in how they implement the lead rule could have broad implications for public health protection. Overall, EPA estimates that there are currently about 2,800 combined distribution systems that encompass about 13,900 individual systems, likely accounting for a significant share of all community water systems.[38] Under EPA regulations that establish general requirements for drinking water monitoring, states may modify the monitoring requirements imposed on combined distribution systems—typically by reducing the number of samples required within the combined system—"to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes."[39] However, in the case of the lead rule, EPA strongly discouraged such modifications, commenting that they would not be appropriate because the primary source of elevated lead levels at the tap is materials within the distribution system.

At least four of the states we contacted—Massachusetts, Michigan, Oregon, and Washington—approved modified sampling arrangements at combined distribution systems. For example, the Massachusetts Water Resources

[37]Under EPA's proposed definitions, a "water wholesaler" is a water system that sells or otherwise delivers treated water to another system on a regular basis (at least 60 days per year); a "consecutive system" is a system that buys or otherwise receives some or all of its treated water from another water system at least 60 days per year. EPA defines the totality of the distribution systems of all interconnected wholesale and consecutive systems as a combined distribution system.

[38]We were unable to confirm the actual number of community water systems in EPA's estimate. According to EPA, they are in the process of developing better data on the number and type of water systems involved in combined distribution systems.

[39]40 C.F.R. § 141.29. EPA must concur with modified monitoring arrangements.

Authority, which supplies all of the drinking water for 30 communities,[40] currently takes lead samples at 440 locations under its modified sampling arrangement—significantly fewer than the 1,720 samples that would be required if each of the consecutive systems tested for lead individually. On the other hand, if the combined distribution system represented a single water system, only 100 samples would be required.

EPA does not have comprehensive information on the extent to which states are approving modified sampling arrangements at combined distribution systems—or the reporting practices used by such systems. As table 8 shows, we found differences in how combined distribution systems calculated and reported their 90th percentile test results.

Table 8: Examples of Different Reporting Practices for Lead Testing in Combined Water Distribution Systems as of June 2005

Water wholesaler	Number of consecutive systems fully supplied by the wholesaler[a]	How the systems are listed in EPA's database	How the 90th percentile lead levels are calculated and reported in EPA's database
Detroit, MI	72	Wholesaler and each consecutive system are listed separately	Separate lead level calculations for the wholesaler and each consecutive system
Massachusetts Water Resources Authority (MA)	30	One listing for the combined distribution system (including the wholesaler and the consecutive systems)	One overall result, reported for the combined distribution system
Philadelphia, PA	3	Wholesaler and each consecutive system are listed separately	Separate lead level calculations for the wholesaler and each consecutive system
Portland, OR	15	Wholesaler and each consecutive system are listed separately	One overall result; same 90th percentile reported for wholesaler and each consecutive system
Seattle, WA	19	One listing for the combined distribution system (including the wholesaler and the consecutive systems)	One overall result, reported for the combined distribution system

Source: GAO analysis of data from EPA and the wholesaler water systems.

[40]According to a Massachusetts Water Resources Authority official, the 30 communities receive corrosion control from the Authority and are part of the modified sampling arrangement approved by the Massachusetts Department of Environmental Protection. The Authority also provides more limited services to 17 other systems, including water that is mixed with local supplies in some cases and emergency water supplies in other cases. Each of these other systems has its own lead rule compliance program.

[8]The water wholesalers may also partially supply other systems or provide emergency supplies, and may sell water to certain non-transient, noncommunity water systems—systems that serve at least 25 people for more than 6 months in a year—and generally are subject to the same requirements as community water systems.

Not only do the reporting practices approved by the states affect the amount of information available to the public—they can also have implications for the corrective actions that are taken to reduce lead levels. For example, reporting one overall result for lead testing can be misleading if the 90th percentile levels at individual consecutive systems would have exceeded the action level. In the case of the Massachusetts Water Resources Authority, although EPA's database contains the overall result for the combined system, authority officials calculated the 90th percentile results for each of the consecutive systems and determined that lead concentrations at some of them exceeded the action level.[41] State officials in Massachusetts told us that until recently, none of the consecutive systems whose individual test results exceeded the action level were required to meet public notification or public education requirements or to replace lead service lines—as long as the result for the combined system met the action level. Although EPA regional officials concurred with such arrangements when they were first established, EPA is now considering how to ensure that the lead rule requirements will be applied to each community within a combined distribution system. Based on discussions with EPA regional officials, Massachusetts has already changed its policy and will be revisiting agreements with combined distribution systems.

Outdated Plumbing Standards Hinder Efforts to Reduce Exposure to Lead in Drinking Water

The standards applicable to plumbing products are important to utility managers who are responsible for ensuring the quality of water at the tap but have little control over household plumbing. However, existing standards may not be protective enough, according to some experts, because testing has determined that some of the products defined as "lead-free" under the Safe Drinking Water Act can still contribute high levels of lead to drinking water. For example, although the act prohibits the use of solder or other plumbing materials in the installation or repair of any public water system if it is not lead-free, lead-free is defined to include materials that contain small amounts of lead. That is, solders and flux may contain up to 0.2 percent lead, pipes and pipe fittings may contain up to 8 percent lead.

[41]In this case, the individual communities did notify their customers of the 90th percentile results for the applicable consecutive system. However, EPA's database does not contain this information so it is not readily available to the public at large.

In addition, plumbing fittings and fixtures may leach lead up to 11 parts per billion into drinking water and still be deemed lead-free, according to voluntary standards established by an independent organization and accepted by EPA.[42]

NSF International (NSF)—a not-for-profit, non-governmental organization involved in standards development and product certification—established the standard in 1997.[43] NSF used a voluntary consensus process that included representatives from regulatory agencies, industry, water suppliers, consultants, and other users of the products governed by the standard.

One problem with the current regulatory framework is that certain devices used in or near residential plumbing systems are not covered by all standards for lead-free plumbing. Table 9 shows how the standards governing lead content and lead leaching apply to specific categories of products.

Table 9: Applicability of Standards for Lead-Free Plumbing Products

Type of plumbing product	8% limit on lead content	11 ppb limit on lead leaching
Endpoint devices, such as kitchen and lavatory faucets, water dispensers, drinking fountains, and residential refrigerator ice makers[a]	X	X
In-line devices, such as meters and valves[b]	X	

Source: EPA and NSF International.

[a]NSF defines endpoint devices as mechanical plumbing devices, components, and materials that are typically installed with the last liter of the distribution system and are intended by the manufacturer to dispense water for human consumption.

[b]NSF defines in-line devices as devices installed on a service line of building distribution system downstream of the water main and before endpoint devices. They include devices in a building used to measure or control the flow of water in treatment, transmission, or distribution systems and are in contact with drinking water.

[42]42 U.S.C. § 300g-6(a),(d),(e).

[43]See NSF, *ANSI/NSF Standard 61: Drinking Water System Components – Health Effects* (Ann Arbor, Mich.: 1997). NSF focuses on food, water, indoor air, and the environment. NSF is accredited by the American National Standards Institute (ANSI) to provide third-party certification to NSF Standard 61.

Some of the products that are not covered by the voluntary leaching standard have been found to contribute high levels of lead to drinking water during testing. For example, tests conducted by NSF indicate that certain meters and valves may contribute high levels of lead to drinking water. At our request, NSF compiled test results for a nonprobability sample of water meters and valves that had been submitted for evaluation. While all of the products in the sample were well below the 8 percent limit on lead content, the test results showed that the amount of lead leached from the selected water meters ranged from 0.4 parts per billion up to 39 parts per billion and, in the case of valves, ranged from a low of 4.1 parts per billion to as much as 530 parts per billion. An NSF official commented that although these products are representative of what is submitted to NSF for testing, they are probably not representative of what is available in the marketplace because some manufacturers have two product lines—a low-lead line for buyers who specify products that meet NSF Standard 61 and a higher-leaded line for other buyers.

Another issue is that NSF's testing protocol for lead leaching may not accurately reflect actual conditions and may need to be modified. One recent study identified several aspects of NSF's testing protocol that should be reevaluated, including, for example, the chemistry of the water in which tests are conducted. After demonstrating that potentially unsafe devices could pass NSF's test, the study concluded that the protocol "lacks the rigor necessary to prevent installation of devices that pose an obvious public health hazard."[44] NSF officials told us that they are aware of the concerns and have already made some clarifications and changes to the protocol. NSF has also established a task force, the Drinking Water Additives Joint Committee, which will be reviewing the protectiveness of NSF Standard 61 and related testing.

Representatives of NSF, water utilities, and researchers also took issue with the standard for lead content, noting that it has not been updated to reflect current manufacturing capabilities and practices. According to the American Water Works Association, manufacturing technology in the plumbing industry has improved since the lead-free definition was established nearly 20 years ago, and today's plumbing products contain less lead as a result. Data on the lead content of plumbing products voluntarily submitted to NSF for evaluation, shown in table 10, suggest that

[44]Dudi, A., Schock, M., Murray, N., and Edwards, M., *Lead Leaching from Inline Brass Devices: A Critical Evaluation of the Existing Standard*, Journal AWWA (August 2005).

manufacturers can produce products with lead levels well below the 8 percent standard.

Table 10: Summary of NSF Test Results Regarding Lead Content of Plumbing Products Voluntarily Submitted to NSF for Certification

	Results of testing on faucets		Results of testing on meters and valves	
Lead content	**Cumulative number**	**Cumulative percent**	**Cumulative number**	**Cumulative percent**
1.0% or less	2,069	37.3	930	75.1
3.7% or less	5,495	99.0	1,104	89.1
8.0% or less	5,551	100.0	1,236	99.8
Total products tested	**5,551**	**100.0**	**1,239**	**100.0**

Source: NSF.

Note: This table contains cumulative data on the number and percent lead content of faucets, meters, and valves voluntarily submitted to NSF for certification. The data should not be generalized beyond this group.

According to NSF, the extent to which lead leaches from products containing lead is not directly proportional to the level of lead used in any one alloy contained in the product.[45] NSF identified several factors that contribute to the level of leaching, including the corrosiveness of the water, lead content, the extent of the leaded surface area, and the process used to manufacture the product. However, the state regulators, water industry representatives, and other experts we interviewed generally agreed that lowering the existing standard for lead content is feasible and would provide an extra margin of safety. Both the Copper Development Association and the Plumbing Manufacturers Institute acknowledged that most plumbing products are below the 8 percent limit on lead content but prefer that plumbing standards focus on performance—the leaching of lead—rather than content.

We did not attempt to determine the extent to which the standards for lead-free plumbing products are enforced. According to NSF, the use of plumbing products within a building is generally regulated at the state, county, and city levels through plumbing codes. NSF representatives also said that all model plumbing codes reference NSF Standard 61 for pipes,

[45]McLellan, C., Purkiss, D., and Greiner, P., *Interim Report on Extraction Results on Leaded Products Submitted for Evaluation Under NSF/ANSI 61*, NSF International (Ann Arbor, Mich.: June 2005).

fittings, and faucets.[46] NSF reports that most faucets sold at the retail and wholesale level are certified to meet Standard 61, but fewer valves and other in-line devices are certified to the standard because it is not required in model plumbing codes.

State efforts to implement more stringent standards for plumbing products appear limited, based on our discussions with federal and state regulators and representatives of the water industry and plumbing manufacturers. We identified two states in which such activities have occurred:

- In California, the Attorney General sued 16 manufacturers and distributors of kitchen and bathroom faucets in the early 1990s, alleging that lead leaching from brass components of their faucets violated California law.[47] The suit resulted in settlement agreements with the companies and a related court decision in which they agreed to reduce leaching levels. According to an official with the California Attorney General's Office, the limit on lead leaching is 5 parts per billion for residential kitchen faucets and 11 parts per billion for all other faucets.

- According to officials with the Massachusetts Board of State Examiners of Plumbers and Gas Fitters, in 1995 the board established a 3 percent limit on the lead content of endpoint and in-line devices installed inside the home. Board officials acknowledge that enforcement of the standard is difficult because products containing more than 3 percent lead may be sold in Massachusetts stores as long as the products are not installed in Massachusetts homes. Moreover, the packaging does not indicate lead content or certification to the state standard.

At the local level, some water systems are installing no-lead meters—which contain less than 0.25 percent lead—because of concerns about the potential impact of leaded brass meters on lead levels at the tap. In some instances, the water systems are targeting their meter replacement to buildings housing schools and child care facilities.

[46]Model plumbing codes include the International Plumbing Code and the United Plumbing Code.

[47]See Cal. Safety & Health Code § 25249.5 (part of the initiative known as Proposition 65 adopted by popular vote in 1986).

EPA Is Considering Modifications to the Lead Rule to Address Some Problem Areas

Based on its year-long evaluation of the lead rule and how it is being implemented, EPA concluded that the conditions that led to elevated lead levels in the District of Columbia were not indicative of the conditions nationwide. However, in November 2004, while its evaluation was still ongoing, EPA issued a guidance memorandum to reiterate and clarify specific regulatory requirements after the agency's review of state programs and some press reports identified inconsistencies in how drinking water systems and the states were carrying out the regulation. The memorandum focused on requirements related to collecting samples and calculating compliance. In addition, in March 2005, EPA announced a Drinking Water Lead Reduction Plan to improve and clarify specific areas of the rule and the agency's guidance materials. The plan identifies nine targeted revisions of the regulations and updates to two guidance documents.

Specifically, EPA's lead reduction plan calls for regulatory revisions to the following:

- **Monitoring requirements.** These revisions would (1) clarify the number of samples required, (2) clarify the number of locations from which samples should be collected, (3) modify definitions of "monitoring period" and "compliance period," (4) clarify the requirement to take all samples within the same calendar year, and (5) reconsider allowing large water systems that exceed the lead action level to qualify for reduced monitoring as long as their test results for water quality parameters are within acceptable limits.

- **Treatment requirements.** These revisions would require water systems to notify the state of treatment changes 60 days prior to the change rather than within 60 days following the change.

- **Customer awareness requirements.** These revisions would (1) require water systems to disclose test results to homeowners and occupants who participate in tap monitoring programs and (2) permit states to allow water systems to modify flushing instructions—the amount of time that homeowners are advised to run water before using it—to address local circumstances.

- **Lead service line replacement requirements.** These revisions would require water systems to reevaluate lead service lines that previously "tested out" of the replacement program as a result of low lead levels if a

subsequent treatment change causes the systems to exceed the action level.[48]

In addition, EPA is considering updating its 1994 guidance on lead in drinking water in schools and non-residential buildings, along with its 1999 guidance on simultaneous compliance.

So far, EPA has not released additional details on the nature of the changes being considered in some areas (e.g., number of samples and sampling locations) or what prompted its determination that revisions to the lead rule and related guidance might be warranted. An EPA workgroup, which was established when the lead reduction plan was issued, is developing the proposed rule for the regulatory changes, with a goal of releasing a proposal in late 2005 or early 2006. Revisions to the guidance documents are scheduled to be completed about the same time.

While the exact nature of some changes has yet to be defined, we asked the 10 states we contacted for their views on whether the proposed revisions would improve implementation of the lead rule. For the most part, state officials were in favor of the proposed changes involving the monitoring protocols. Although they wanted more details on how the requirements would be revised, they believed the changes to be relatively minor. In particular, most state officials agreed that large water systems that exceed the action level should not be allowed to reduce the frequency of lead monitoring based solely on their ability to meet water quality parameters.

Regarding earlier notification of treatment changes, officials from all 10 states we contacted supported such a revision, particularly for major treatment changes. The officials indicated that the notification requirement would not have a significant impact on their own practices because each of the states already had some type of process in place to permit or review treatment changes. Five of the states questioned whether 60 days advance notice would be sufficient to allow an adequate review. Several states suggested that EPA should require expedited monitoring of lead levels following major treatment changes—or issue guidance on when it would be appropriate for states to require such monitoring—and that EPA should issue guidance on what constitutes a major treatment change. In addition,

[48]Under the lead rule, water systems are not required to replace an individual lead service line if the lead concentration in all service line samples from that line is less than or equal to 15 parts per billion. This is sometimes referred to as the "test-out" provision.

officials from two states commented that EPA should require state approval of the treatment changes in addition to advance notification.

On the proposed revisions involving customer awareness, all 10 states agreed that homeowners that participate in the tap sampling program should be informed of the test results—particularly if the results for individual homeowners exceed the lead action level—whether or not the 90th percentile result for the entire system exceeds the action level. One state was concerned about the additional resources that would be required to track the water systems' actions. Nearly all of the states also endorsed the proposal to give states and water systems more flexibility in determining what flushing instructions are appropriate in particular situations. Some states suggested that EPA guidance on making such determinations would be useful.

Regarding the proposed reevaluation of lead service lines that tested out of a replacement program, the states' views were mixed. Although five states generally endorsed the idea, the other five states raised several concerns, including the potential cost to local drinking water systems, the administrative burden that such a requirement would impose on states, and the need for more specific information on the types of treatment changes that would trigger a reevaluation of lead service lines.

Over the long term, EPA plans to examine other issues related to lead rule implementation that may need to be addressed through regulation or guidance. EPA officials have indicated that, in some instances, they need more information to determine whether changes are warranted, and they are in the process of collecting and analyzing data, or have relevant research projects underway. According to EPA officials, some of the issues they plan to review include the sampling protocol, monitoring and reporting requirements for consecutive systems, the impact of disinfection treatment on corrosion control, and the requirements for lead service line replacement.

Limited Data Indicate Few Schools and Child Care Facilities Test or Take Other Measures to Control Lead in Their Water Supplies

Little information exists on the results of activities initiated after enactment of the Lead Contamination Control Act (LCCA) of 1988, including the recall of lead-lined water coolers from schools and child care facilities. More recent efforts to detect and remediate lead in the drinking water at such facilities also appear limited. As a result, the extent to which drinking water may contain unacceptable levels of lead at schools and child care facilities nationwide is uncertain. In addition, no clear focal point exists at the federal or state level to collect and analyze the results of testing and remediation efforts. Moreover, state and local officials say that addressing other environmental hazards at schools and child care facilities takes priority over testing for lead in drinking water.

Little Information Exists on the Results of the Recall of Lead-Lined Water Coolers and Other Activities Prompted by the LCCA

The LCCA, enacted in 1988, laid out a number of requirements for EPA, the Consumer Product Safety Commission, and the states to address the potential risks of lead contamination in water supplies serving schools and child care facilities. Among other things, the act

- banned the manufacture and sale of drinking water coolers containing lead-lined tanks and other water coolers that are not lead-free,
- required EPA to publish a list of such coolers and distribute it to the states along with guidance on testing for and remedying lead contamination in drinking water, and
- required the Consumer Product Safety Commission to issue an order requiring manufacturers and importers to (1) repair or replace the coolers or (2) recall and provide a refund for them because coolers containing lead-lined tanks were deemed to be imminently hazardous consumer products.

In addition, the LCCA required states to establish programs to assist local agencies in addressing potential lead contamination. While the nature and extent of state activities varied widely, the program was never funded, according to EPA officials. In 1996, the requirement was determined to be unconstitutional.[49]

[49]See ACORN v. Edwards, 81 F.3d 1387 (5th Air. 1996).

To support the required recall, EPA identified six models of water coolers containing lead-lined tanks, all produced by one company and manufactured prior to April 1979. EPA could not obtain information on the number of units produced. The Consumer Product Safety Commission broadened the recall order to include all tank-type models of drinking water coolers manufactured by the company, whether or not the models were included on EPA's list.[50] Under the terms of the order, the manufacturer established a process under which qualified owners of the affected coolers could request a refund or replacement. The manufacturer was also required to notify appropriate officials and organizations, including state and school officials and day care centers, about the recall and the availability of refunds and replacements.

Little information is available to determine the effectiveness of the recall effort in removing lead-lined water coolers from service.[51] Not only is the number of coolers affected by the recall unknown, but the Consumer Product Safety Commission did not have summary data on the results of the recall. An agency official confirmed information in a 1991 Natural Resources Defense Council report that, as of 1990, the Commission had received approximately 1,200 inquiries about the recall, 1,373 coolers had been determined to be eligible for replacement, 514 had been replaced, and 105 refunds had been mailed to customers.[52] However, the official also said that many more coolers were replaced after that date and that by 1993, the manufacturer had received approximately 11,000 inquiries about the recall. The official believed that the actual number of replacements was potentially 10 times greater than those reported in 1991 and the refunds four to five times greater. In addition, the recall order did not specify an end date for filing a refund or replacement request so an unknown number of coolers could have been taken out of service without the knowledge of the manufacturer or the Commission subsequent to 1993.

[50]55 Fed. Reg. 22387 (June 1, 1990).

[51]Under the terms of the recall order, the manufacturer was required to (1) provide periodic reports to the Commission for 3 years, including information on the number of replacements shipped and refunds mailed, and (2) maintain records related to the recall for 5 years.

[52]Natural Resources Defense Council, *The Lead Contamination Control Act: A Study in Non-Compliance* (June 1991). Because this study is used for context purposes, we did not assess its reliability.

According to several state and school officials we interviewed, virtually all of the water coolers affected by the recall have been replaced or removed, either as a result of the publicity surrounding the recall or because they had already been taken out of service. Some of the six models covered by the recall were manufactured in the 1950s and 1960s and are likely to have been retired because of their age or maintenance problems.

Beyond the recall effort, little or no data are available to assess the effectiveness of other actions taken in response to the LCCA. For example, little information is available on the extent to which schools and child care facilities were inspected to check potential lead contamination from water coolers that were not lead-free. While the act did not require EPA or the states to track or report on the results of testing, EPA was responsible for publishing guidance and a testing protocol to assist schools in determining the source and degree of lead contamination in school drinking water supplies and remedying such contamination. EPA published guidance for both schools and child care facilities in 1989 and 1994, respectively.[53]

We found no information indicating how pervasive lead-contaminated drinking water in such facilities nationwide or within particular states might be, but several studies conducted in the early 1990s contained some limited information on testing efforts:

- In 1993, we reported on the results of a survey of 57 school districts in 10 states.[54] We found that 47 districts were able to provide data on the results of testing, which showed that about 15 percent of the 2,272 schools tested had drinking water containing levels of lead considered unacceptable by EPA. We also contacted child care licensing agencies in 16 states to obtain information on their activities for addressing lead hazards and found that none of the agencies routinely inspected child care facilities for such hazards.

[53]EPA published the first guidance document in 1989. See EPA Office of Water, *Lead in School's Drinking Water*, EPA 570-9-89-001 (Washington, D.C.: Jan. 1989). EPA updated the guidance in 1994. See EPA Office of Water, *Lead in Drinking Water in Schools and Non-Residential Buildings*, EPA 812-8-94-002 (Washington, D.C.: Apr. 1994). Also in 1994, EPA published a separate guidance document to address child care facilities. See EPA Office of Water, *Sampling for Lead in Drinking Water in Nursery Schools and Day Care Facilities*, EPA 812-B-94-003 (Washington, D.C.: Apr. 1994).

[54]GAO, *Toxic Substances: The Extent of Lead Hazards in Child Care Facilities and Schools Is Unknown*, GAO/RCED-93-197 (Washington, D.C.: Sept. 14, 1993).

- A 1990 report by EPA's Inspector General found that, of the 13 school districts surveyed, 10 conducted some testing for lead in drinking water and 8 detected contamination, with some results exceeding acceptable levels by a wide margin.[55]

- According to the Natural Resources Defense Council's 1991 study,[56] 47 states reported some testing of school drinking water supplies, including 16 states that tested in "a few" to 25 percent of their schools, 27 states that tested from 25 percent to 82 percent of the schools, and 4 states that tested 95 percent or more of their schools. The study also found that 17 states reported testing at child care facilities.

In addition to these earlier studies, in 2004 EPA asked the states to provide information on current state and local efforts to monitor and protect children from lead exposure in drinking water at schools and child care facilities.[57] As part of that effort, seven states also reported on the results of local testing following passage of the LCCA, stating that elevated lead levels were found in at least some of the locations tested.[58] However, the states differed significantly in the extent of their testing and how they summarized the results. In five of the states, the results generally ranged from about 1 percent to 27 percent of samples, facilities, or districts with lead levels considered unacceptable by EPA—but the other two states finding elevated lead levels used a different assessment measure.

[55]EPA Office of the Inspector General, *Report of Audit on the Lead in Drinking Water Program*, Report No. E1HWF9-03-0316-0100508 (Washington, D.C.: Sept. 28, 1990).

[56]*The Lead Contamination Control Act: A Study in Non-Compliance*, pp. 6-7.

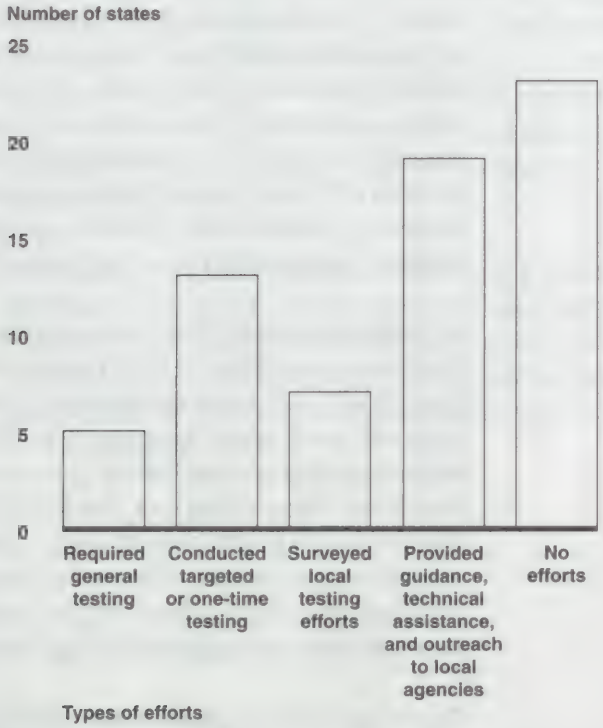
[57]EPA, *Controlling Lead in Drinking Water for Schools and Day Care Facilities: A Summary of State Programs*, EPA-810-R-04-001 (Washington, D.C.: July 2004).

[58]Although not reported in response to EPA's information request, Washington state also conducted a survey of school testing shortly after the LCCA was enacted and found that 25 percent of 121 schools that conducted testing detected unacceptable levels of lead in one or more drinking water outlets.

Current Efforts to Detect and Remediate Lead in Drinking Water at Schools and Child Care Facilities Also Appear Limited

The extent of current testing and remediation activities for lead in school and child care facility drinking water appears limited. The LCCA does not require states to track or report such activities and, based on the information that EPA collected from the states in 2004 and our own contacts in 10 states, few states have comprehensive programs to detect and remediate lead in drinking water at schools and child care facilities. Figure 4 shows the nature and extent of these activities; about half the states reported no current efforts.

Figure 4: Summary of State Efforts to Address Lead in Drinking Water at Schools and Child Care Facilities



Source: EPA and selected states.

Notes: (1) All states but Colorado responded to EPA's information request; about half the states submitted multiple responses, generally because responsibility for addressing lead issues at schools and child care facilities is shared by both health and environmental agencies.

(2) The figure summarizes the most frequently reported activities by the states. While nearly half the states reported no activities, others reported activities in more than one of the categories we used. In addition to the activities summarized in figure 4, 26 states reported having lead poisoning prevention programs that include testing blood lead levels of children and investigating the source of any problems identified. We did not include these programs in our summary because the investigations usually focus

initially on a child's home environment and the presence of lead paint. However, they could ultimately involve testing the drinking water at schools or child care facilities.

(3) Some states reported testing for lead at schools or child care facilities that have their own water systems. We did not include this activity in figure 4 because such testing is required under the Safe Drinking Water Act.

Of the five states that reported having testing requirements, four—Connecticut, New Hampshire, South Carolina, and Vermont—require child care facilities to test their drinking water for lead contamination when obtaining or renewing their licenses.[59] In the fifth state (Massachusetts), the testing requirement focuses on schools. Water systems must include two schools among their sampling sites in each round of lead testing, although the school data are not included in the 90th percentile calculation to determine whether lead levels exceed the action level. Massachusetts officials told us that, although the testing requirement has been in place since 1992, it has not received much attention until recently. The officials acknowledged that most water systems repeatedly used the same schools as sampling sites for the sake of convenience and said that the state has never summarized the results of the school testing. Given the renewed concerns about lead contamination following the detection of lead in the District of Columbia's drinking water, Massachusetts now requires water systems to rotate testing among schools and child care facilities and plans to issue a summary report at the end of 2005.

In addition to these requirements, Florida's Department of Environmental Protection reported to EPA that it had established a voluntary program. Specifically, the state designated child care facilities as Tier 1, high risk sites and gave water systems the option of using the facilities as lead sampling sites and including them in the calculation of the 90th percentile lead level. (According to a Florida official, to be included as a sampling site, the child care facility must meet other Tier 1 criteria, such as being served by a lead service line.) However, when we followed up with state officials, they said that they had no way of tracking the extent to which water systems were actually including child care facilities as sampling sites.

The scope of the targeted testing reported by 12 states varied widely, from a single school district in Pennsylvania to over 1,300 homes and child care facilities in Indiana. Several states indicated that they were focusing on potential high risk locations. EPA regional offices helped to initiate some limited testing in a few states, including Massachusetts, New Jersey, New

[59]In New Hampshire, the testing requirement applies only to facilities that care for 24 or fewer children and have their own independent water supply.

York, and Pennsylvania; the testing generally focused on a few of the states' largest school districts. The state-sponsored surveys to determine the status of testing by local agencies also varied, with some covering all schools within the state and others focusing on a smaller subset of schools. In Washington, the state recently set aside $750,000, including $400,000 from its drinking water state revolving fund, to partially reimburse school districts for the cost of monitoring for lead in elementary schools' drinking water.

EPA officials attributed the relatively low level of state activity in recent years to the aftereffects of a 1996 lawsuit brought by the Association of Community Organizations for Reform Now against the state of Louisiana for not doing enough to implement the LCCA. The case resulted in a federal circuit court decision declaring that part of the LCCA was unconstitutional. Specifically, the court ruled that the federal government did not have the authority to require states to establish a remedial action program as outlined in the LCCA.[60] While Louisiana reported to EPA that the case "had the unintended effect of ending the lead program in schools for the state of Louisiana," none of the 10 states we contacted cited the ruling as a factor in limiting their efforts.

To obtain more information about testing and remedial actions in individual cities, we contacted five school districts—Boston, Detroit, Philadelphia, Seattle, and Syracuse. Table 11 shows the extent and results of testing within each district, and provides information on the various approaches school administrators have used to address the lead contamination.

[60]See ACORN v. Edwards, 81 F.3d 1387 (5th Cir. 1996).

Table 11: Information on Recent Efforts to Test for and Remediate Lead in Drinking Water in Five School Districts

School district	Scope and results of testing	Type and cost of remedial actions
Boston, Mass. Public Schools[a]	Scope: Testing focused on kitchen facilities used to prepare food and was conducted between 2003 and 2004 at the district's central kitchen facility and 38 schools with on-site kitchen facilities. Results: Lead levels in water from 17 kitchen facilities, including the central kitchen, exceeded 20 ppb.	Actions: Manual flushing for at least 1 minute each day in all kitchens and an automatic flushing program at the central kitchen and 22 school buildings with kitchen facilities. Cost: Not available.
Detroit, Mich. Public Schools	Scope: The district tested 21 water fountains and other outlets in one middle school as of November 2002. (Testing was also conducted at one other middle school, but the number of outlets included was not available.) Results: Lead levels in water from 16 drinking water outlets in one middle school exceeded 15 ppb.	Actions: For the short term, shutting off outlets with elevated lead levels, doing manual flushing, and providing bottled water. For the long term, installing a water treatment system, replacing lead piping and fixtures, and re-routing a service line serving the school. Cost: An estimated $9,000 for bottled water and $5,865 for the water treatment system, plus $800 in annual maintenance costs.
Philadelphia, Pa. School District[b]	Scope: As a result of consent orders in 1999 and 2000, the school district was required to test all drinking water outlets at 299 schools and other buildings, or about 30,000 outlets in total.[c] Results: As of March 2004, the district had detected lead levels over 20 ppb in approximately 4,600, or roughly 15 percent, of the outlets tested.	Actions: For the short term, shutting off outlets with elevated lead levels and providing bottled water. For the long term, replacing or removing fixtures. Cost: An estimated $6 million through February 2005.
Seattle, Wash. Public Schools[b]	Scope: In 2004, the district tested all interior drinking water outlets considered suitable for use, about 2,400 outlets in total. Results: Lead levels at 600 of the outlets, or 25 percent, exceeded 20 ppb.	Actions: For the short term, shutting off outlets with elevated lead levels and providing bottled water. For the long term, fixing or replacing fixtures, installing filters, and replacing piping for any outlet where lead levels exceeded 10 ppb. Cost: An estimated $15 million upon completion in 2007.

(Continued From Previous Page)

School district	Scope and results of testing	Type and cost of remedial actions
Syracuse, N.Y. City School District	Scope: The district tested specific interior drinking water outlets in 50 schools and other buildings, beginning in August 2003. Results: 23 of the facilities had at least one drinking water outlet with lead levels over 20 ppb.	Actions: For the short term, shutting off outlets with elevated lead levels. For the long term, installing in-line carbon filters at each outlet with elevated lead levels. (Other measures such as pipe replacement and removal of fixtures are still under discussion.) Cost: An estimated $100,000 through March 2005.

Source: EPA and school districts.

[a]Boston officials told us that they focused on kitchen facilities in their most recent testing because the district had already installed bottled water at many drinking water outlets after earlier testing had disclosed elevated lead levels.

[b]Both Philadelphia and Seattle had also conducted some testing prior to the more recent efforts summarized in this table.

[c]A 2003 modification to the earlier consent orders removed the requirement to test bathroom faucets.

The cities we contacted differed in the testing protocols they used to test for lead in school drinking water.[61] While three of the cities (Boston, Philadelphia, and Syracuse) followed EPA's guidance, using a 250 milliliter sample and a limit of 20 parts per billion for triggering follow-up action, Seattle took a more conservative approach. Using the same sample volume, the school board established 10 parts per billion as its standard for follow-up action. Detroit, on the other hand, used the same protocol that is required for public water systems—a 1 liter sample and 15 parts per billion as the limit.

Some of the remediation measures adopted by the cities we contacted were effective, including installing in-line filters, replacing pipes, and removing fixtures at outlets with test results indicating high lead levels. Other measures required more attention and others inadvertently created new issues for officials to deal with. For example, a Seattle school official noted

[61]In EPA's guidance for schools and child care facilities, the agency recommends using a sample volume of 250 milliliters and establishes lead concentrations greater than 20 parts per billion as the trigger for follow-up action. In contrast, the testing protocol for public water supplies requires a sample volume of 1 liter and follow-up action if lead levels at the 90th percentile exceed 15 parts per billion. According to EPA, the testing protocol for water systems is designed to assess lead levels for the system as a whole, using a representative number of households; if applicable, the testing also serves as a means of determining the effectiveness of corrosion control treatment. The protocol for schools and child care facilities is slightly more stringent than that used in water systems, and is designed to determine lead levels at specific outlets.

that the district decided against instituting a flushing program in its schools because it was too difficult to ensure that staff in individual schools would follow through with the flushing every day. In Boston, a school official told us that using bottled water posed a problem because staff had to make sure that replacement bottles were always available and because it created other issues with pests, vandalism, and spillage.

The Extent to Which Drinking Water at Schools and Child Care Facilities Is Contaminated by Lead Is Uncertain, in Part, Because No Clear Focal Point Exists to Collect Available Data

While a number of cities have detected elevated lead levels in school drinking water, and a few states are beginning to collect information on the status of local testing efforts, little information exists on the extent to which drinking water at schools and child care facilities nationwide may contain unacceptable levels of lead. No focal point exists at the federal or state level to collect and analyze test results or information on cost-effective remediation strategies. As a result, it is difficult to get a sense of the pervasiveness of lead contamination in the drinking water at schools and child care facilities, and to know whether a more concerted effort to address the issue—such as mandatory testing—is warranted. In addition, remediation measures such as providing bottled water, regularly flushing water lines, installing filters, and replacing fixtures and internal piping vary widely in cost and complexity, among other factors. State and local officials have expressed concern about not having sufficient information on the measures, their pros and cons, and circumstances in which particular measures might be more appropriate than others.

At the federal level, EPA's Office of Ground Water and Drinking Water sets drinking water standards and other requirements for public drinking water systems, but generally does not have any direct oversight responsibility for the quality of drinking water in schools or child care facilities.[62] The U.S. Department of Education (Education) is responsible for, among other things, providing guidance and financial assistance to state and local education agencies for elementary and secondary schools. Education's Office of Safe and Drug Free Schools recently signed a memorandum of understanding with EPA, the Centers for Disease Control and Prevention, and various water industry associations with the goal of reducing children's

[62]Some schools and child care facilities have their own water sources and are subject to Safe Drinking Water Act requirements, such as the lead rule. Such systems are defined as non-transient, noncommunity water systems, which serve at least 25 people for more than 6 months in a year. According to EPA estimates, about 10,000 schools and child care facilities are regulated as non-transient, noncommunity systems but, according to one official, these data are incomplete.

exposure to lead in drinking water at schools and child care facilities.[63] However, according to an Education official, the department does not have legal authority to compel schools to test for lead in the drinking water. Officials in Washington state saw a need for closer coordination between EPA and Education. The officials believe that local education officials are more likely to respond to guidance on lead and other environmental health issues if Education were to be involved in developing it.

At the state level, responsibility for the environmental health of schools and child care facilities is usually fragmented among multiple agencies. According to EPA, in most states, the same agency that administers the drinking water program—generally the state's department of environmental protection or department of health—is also responsible for implementing the LCCA. However, we also learned from EPA that the state agencies responsible for administering education programs and licensing child care facilities are usually the ones with the regulatory or oversight authority over environmental conditions in schools and child care facilities. (As noted earlier, some states also have lead poisoning prevention programs to monitor blood lead levels in children and investigate the source of lead exposure when the levels are elevated.) According to some of the states we contacted, the level of coordination among state agencies needs to be improved and the lack of a centralized authority at the state level has complicated efforts to plan and implement a testing program for lead in water in some school districts. For example, in Pennsylvania, state drinking water officials said that several other agencies, including the Departments of Health, Education, and Public Welfare, have a role in overseeing schools and child care facilities—but it was unclear which agency would be best suited to manage a testing program if one were to be required. In contrast, Connecticut officials said that having both the drinking water program and the child care licensing program housed within the same department has been an advantage because it is easier for the programs to share information and coordinate their activities.

We also contacted several school and child care associations to find out if they were involved in or aware of efforts to promote testing for lead in drinking water, collect and analyze the results of testing, or set standards for the environmental health of the facilities. According to a representative

[63]Specifically, the parties agreed to encourage schools and child care facilities to test drinking water for lead, disseminate the results to the public, and take appropriate actions to correct problems.

of the National Child Care Association, until recently the association had not been aware of any issues regarding lead in drinking water at child care facilities or involved in any effort to promote testing.[64] The representative commented that one challenge to distributing information on lead in drinking water to child care facilities is the fragmented nature of the child care industry. While the National Head Start Association has been involved with lead poisoning prevention in general, the organization has not done anything specifically related to lead in drinking water.[65] The Healthy Schools Network, Inc. promotes the development of state and national policies, regulations, and funding for environmentally safe and healthy schools. Although the network has published some fact sheets that address the potential health risks from lead exposure, lead in drinking water has not been a priority compared with other environmental issues. While none of these organizations were parties to EPA's recent memorandum of understanding, they have been actively engaged in assisting EPA as the agency revises its guidance for schools and child care facilities, according to EPA officials.

State and Local Officials Say Addressing Other Environmental Hazards Takes Priority over Testing for Lead in Drinking Water at Schools and Child Care Facilities

According to state and local officials, children may be exposed to a variety of environmental hazards at schools and child care facilities, including asbestos, lead in paint or dust, mold, and other substances that affect indoor air quality. The officials told us that dealing with such problems often takes priority over checking for lead in drinking water because, in the case of the other problems, more information is available on the nature and extent of the potential health risks involved. For example, many of the officials we interviewed said that the most significant source of lead exposure—and thus, their primary concern—was lead in paint. Officials from two states also mentioned that lead in jewelry, toys, or pottery is a more significant source of exposure than lead in drinking water. Washington state officials told us that child care facilities also have many competing priorities and cited food handling as one of their major concerns.

[64]The National Child Care Association is active in 26 states and represents about 8,000 private, licensed child care facilities that are based outside the home. The association does not represent the family home care industry, which consists of an estimated 3,000 individually-owned family homes that offer child care services.

[65]The National Head Start Association represents more than 1 million children, 200,000 staff, including teachers and family service workers, and 2,700 Head Start programs in the U.S.

At the local level, officials talked about dealing with multiple health and safety issues and the difficulty of prioritizing limited resources. For example, in Detroit, one official told us that dealing with asbestos takes priority over all other environmental concerns, including lead in drinking water. Another Detroit official commented that indoor air quality is another priority because "issues related to breathing are very important to educators." In Philadelphia, a school official noted that a major source of lead in the school district is dust, a problem that requires continuing attention from the maintenance staff, which must set aside time to scrub the areas where dust collects. A Seattle official also mentioned the difficulty posed by competing needs for limited funds. He indicated that the competition is not only among environmental issues, such as mold and asbestos, but, on a broader level, between maintenance and basic classroom expenditures.

Without additional resources—or more compelling evidence that lead in drinking water should be a higher priority—state and local officials, as well as representatives of industry groups, were reluctant to support calls for mandatory testing for lead in drinking water in schools and child care facilities. Many of the officials we interviewed said that more research is needed on several aspects of the lead issue. In addition to wanting more information on the extent to which lead contamination in schools and child care facilities is a problem, some officials also wanted more information on the circumstances in which particular remediation approaches are most effective. Other officials believe that more research is needed on the relationship between children's exposure to lead in drinking water and their blood lead levels.

Conclusions

Ensuring that the lead rule adequately protects public health and is fully implemented and enforced should be a high priority for EPA and the states because the potential consequences of lead exposure, particularly for infants and young children, can be significant. However, EPA's hands are tied unless states report complete, accurate, and timely data on the results of required monitoring, the status of corrective actions, and the extent of violations. Without such information, EPA cannot provide effective oversight or target limited resources where they are most needed. Similarly, inconsistencies among the states' policies and practices for implementing the lead rule may lead to uneven levels of public health protection for consumers and thus need to be examined and corrected, as appropriate.

Given the potential health effects associated with lead contamination, it is important to minimize any unnecessary exposure as a result of leaded materials in the water distribution system or household plumbing. Reevaluating existing standards for the devices used in or near residential plumbing systems would also enhance the effectiveness of the treatment provided by local water systems. In the case of schools and child care facilities, both the vulnerability of the population served by such facilities and the competition for limited resources make it essential to have better information on the nature and extent of lead-contaminated drinking water—and its significance relative to other environmental hazards.

Recommendations for Executive Action

We recommend that the Administrator, EPA, take a number of steps to further protect the American public from elevated lead levels in drinking water. Specifically, to improve EPA's ability to oversee implementation of the lead rule and assess compliance and enforcement activities, EPA should

- ensure that data on water systems' test results, corrective action milestones, and violations are current, accurate, and complete and
- analyze data on corrective actions and violations to assess the adequacy of EPA and state enforcement efforts.

To expand ongoing efforts to improve implementation and oversight of the lead rule, EPA should reassess existing regulations and guidance to ensure the following:

- the sites water systems use for tap monitoring reflect areas of highest risk for lead corrosion;
- the circumstances in which states approve water systems for reduced monitoring are appropriate and that systems resume standard monitoring following a major treatment change;
- homeowners who participate in tap monitoring are informed of the test results; and
- states review and approve major treatment changes, as defined by EPA, to assess their impact on corrosion control before the changes are implemented.

In addition, EPA should:

- collect and analyze data on the impact of lead service line replacement on lead levels and conduct other research, as appropriate, to assess the effectiveness of lead line replacement programs and whether additional regulations or guidance are warranted;
- collect information on (1) the nature and extent of modified sampling arrangements within combined distribution systems and (2) differences in the reporting practices and corrective actions authorized by the states, using this information to reassess applicable regulations and guidance; and
- evaluate existing standards for in-line and endpoint plumbing devices used in or near residential plumbing systems to determine if the standards are sufficiently protective to minimize potential lead contamination.

In order to update its guidance and testing protocols, EPA should collect and analyze the results of any testing that has been done to determine whether more needs to be done to protect users from elevated lead levels in drinking water at schools and child care facilities. In addition, to assist local agencies in making the most efficient use of their resources, EPA should assess the pros and cons of various remediation activities and make the information publicly available.

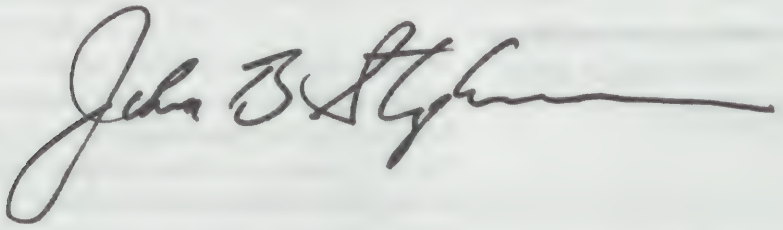
Agency Comments and Our Evaluation

We provided a draft of this report to EPA and the Consumer Product Safety Commission for review and comment. EPA generally agreed with our findings and recommendations. Regarding the completeness of information that EPA has to evaluate implementation of the lead rule, the agency said that it will work with the states to ensure that relevant information is incorporated into the national database and will use the information, in part, to assess the adequacy of enforcement efforts. In addition, EPA agreed that aspects of the regulation need improvement. EPA said that it will address some of these areas as part of its package of revisions to the lead rule that it plans to propose early in 2006, including homeowner notification of test results and criteria for reduced monitoring. EPA also said that it needs additional information before it can address other areas, such as lead service line replacement and plumbing standards, that may warrant regulatory changes. EPA did not comment on our recommendation to reevaluate existing regulations and guidance to ensure that tap

monitoring sites reflect areas of highest risk for lead corrosion. Finally, EPA did not address our recommendations regarding lead contamination and remedial actions at schools and child care facilities. We believe that, given the particular vulnerability of children to the effects of lead, it is important for EPA to take full advantage of the results of any tests that have been done, as well as to identify those remedial activities that have proven to be most effective. EPA's comments appear in appendix V. The Consumer Product Safety Commission generally agreed with our findings as they pertain to the Commission.

As agreed with your offices, unless you publicly announce the contents of this report earlier, we plan no further distribution until 30 days from the report date. At that time, we will send copies to appropriate congressional committees; the Administrator, EPA; the Chairman, Consumer Product Safety Commission; and the Director of the Office of Management and Budget. We will also make copies available to others upon request. In addition, the report will be available at no charge on the GAO Web site at http://www.gao.gov.

If you or your staff have any questions about this report, please contact me at (202) 512-3841 or stephensonj@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made major contributions to this report are listed in appendix VI.



John B. Stephenson
Director, Natural Resources
and Environment

Scope and Methodology

For information on how the lead rule is being implemented, we obtained information from the Environmental Protection Agency's (EPA) Office of Ground Water and Drinking Water and Office of Enforcement and Compliance Assurance, eight EPA regional offices, and 10 states. We selected eight of the states—California, Illinois, Iowa, Massachusetts, Michigan, New York, Pennsylvania, and Washington—because they either had a relatively high number of water systems with test results that exceeded or fell just below the lead action level, or they added to the geographical diversity of our selections. We also included Connecticut and Florida in our review because they were identified by EPA as particularly active in addressing potential lead contamination in water supplies serving child care facilities. At the local level, we obtained information from eight water systems: the Chicago Water Department in Illinois, the Boston Water and Sewer Commission and Massachusetts Water Resources Authority in Massachusetts, the Detroit Water and Sewerage Department in Michigan, the Syracuse Water Department in New York, the Portland Bureau of Water Works in Oregon, the Philadelphia Water Department in Pennsylvania, and Seattle Public Utilities in Washington. Our criteria for selecting these systems included test results showing elevated lead levels, lead service line replacement activity, and/or the use of modified sampling arrangements for consecutive systems. We reviewed the Safe Drinking Water Act, the lead rule, EPA's minor revisions to the lead rule, other pertinent regulations, and applicable guidance to states and water systems.

To gain a national perspective on the data EPA uses for oversight of lead rule implementation, including the results of required testing, the status of corrective actions, and the extent of violations, we analyzed data from EPA's Safe Drinking Water Information System through June 2005 for active community water systems. We assessed the reliability of the data by (1) performing electronic testing of required data elements, (2) reviewing existing information about the data and the system that produced them, (3) interviewing agency officials knowledgeable about the data, and (4) reviewing EPA's own data verification audits and summaries of data reliability. We determined that the data on results and frequency of lead testing were sufficiently reliable to show compliance trends. However, we found that other data on corrective actions and violations were not sufficiently reliable to assess the status of efforts to implement and enforce the lead rule.

For information on experiences in implementing the lead rule and the need for changes to the regulatory framework, we interviewed EPA, state, and local officials; analyzed states' responses to an EPA information request

regarding their policies and practices in implementing the rule; and reviewed other relevant studies and documents. We reviewed the results of EPA's expert workshops on monitoring protocols, simultaneous compliance, lead service line replacement, and public education, and obtained information from several researchers and other drinking water experts. Among other things, we identified potential gaps in the regulatory framework, including oversight, regulations, and guidance, and obtained views on the modifications to the lead rule now being considered by EPA. To learn about the development and effectiveness of existing plumbing standards, we obtained and analyzed information from NSF International (NSF), the Copper Development Association, the Plumbing Manufacturers Institute, and relevant articles and studies. To assess the reliability of NSF's data on lead content and lead leaching of plumbing fittings and fixtures, we talked with foundation officials about data quality control procedures. We determined the data were sufficiently reliable for illustrative purposes.

For information on safeguards against lead-contaminated drinking water at schools and child care facilities, we interviewed officials from the Consumer Product Safety Commission, EPA's Office of Ground Water and Drinking Water, the National Head Start Association, the National Child Care Association, and the Healthy Schools Network. We also obtained information from drinking water program offices and public health or education departments in the 10 states we contacted for the first objective as well as school districts in Boston, Chicago, Detroit, Philadelphia, Seattle, and Syracuse. We reviewed the Lead Contamination Control Act (LCCA) of 1988 and obtained information on the recall of lead-lined water coolers. For information on other actions taken in response to the LCCA, we interviewed EPA, state, and local officials; reviewed relevant studies; and analyzed information collected by EPA. We used the same information sources to determine (1) the extent of current testing and remediation activities for lead in school and child care facility drinking water, (2) the extent to which various entities have responsibility for overseeing or collecting data on such activities, and (3) the relative priorities among environmental hazards common to schools and child care facilities. We also analyzed states' responses to an EPA information request on state and local efforts to monitor and protect children from lead exposure and attended an EPA-sponsored expert workshop on lead in drinking water at schools and child care facilities. For more detailed information on experiences at the local level, we collected information from five school districts on the extent of testing for lead in school drinking water, the results, and the approaches used to address contamination.

We performed our work between June 2004 and November 2005 in accordance with generally accepted government auditing standards.

Detailed Analysis of Corrective Action Milestone Data Reported to EPA, by State, through June 2005

	Large					
	Number of systems			Population of large systems		
State	Total number of systems	Number of systems with milestones	Percent of systems without milestones	Total population served	Population in systems without milestones	Percent of population in systems without milestones
AK	1	0	100.0	135,000	135,000	100.0
AL	11	0	100.0	1,881,984	1,881,984	100.0
AR	8	8	0.0	781,325	0	0.0
AZ	13	0	100.0	3,417,902	3,417,902	100.0
CA	160	0	100.0	25,224,420	25,224,420	100.0
CO	16	0	100.0	2,941,619	2,941,619	100.0
CT	9	9	0.0	1,586,458	0	0.0
DC	1	1	0.0	595,000	0	0.0
DE	3	0	100.0	445,504	445,504	100.0
FL	76	3	96.1	12,098,524	11,805,584	97.6
GA	23	18	21.7	4,544,090	507,529	11.2
HI	4	0	100.0	875,238	875,238	100.0
IA	8	1	87.5	793,026	584,383	73.7
ID	4	1	75.0	353,151	300,800	85.2
IL	30	28	6.7	5,367,282	123,603	2.3
IN	14	14	0.0	2,106,043	0	0.0
KS	6	2	66.7	1,172,516	981,341	83.7
KY	8	0	100.0	1,705,135	1,705,135	100.0
LA	15	0	100.0	2,315,098	2,315,098	100.0
MA	29	14	51.7	4,992,887	3,629,018	72.7
MD	9	7	22.2	4,005,168	106,000	2.6
ME	1	0	100.0	113,560	113,560	100.0
MI	31	28	9.7	3,647,640	318,288	8.7
MN	14	8	42.9	1,610,382	370,533	23.0
MO	11	4	63.6	2,586,464	2,347,737	90.8
MS	2	0	100.0	288,257	288,257	100.0
MT	3	0	100.0	208,335	208,335	100.0
NC	24	0	100.0	3,255,476	3,255,476	100.0
ND	2	2	0.0	146,131	0	0.0
NE	2	0	100.0	709,420	709,420	100.0
NH	2	0	100.0	213,000	213,000	100.0

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	Large					
	Number of systems			Population of large systems		
State	Total number of systems	Number of systems with milestones	Percent of systems without milestones	Total population served	Population in systems without milestones	Percent of population in systems without milestones
NJ	21	0	100.0	4,205,795	4,205,795	100.0
NM	4	0	100.0	660,026	660,026	100.0
NV	5	0	100.0	1,876,500	1,876,500	100.0
NY	32	0	100.0	13,079,586	13,079,586	100.0
OH	27	0	100.0	5,720,471	5,720,471	100.0
OK	9	7	22.2	1,538,179	679,000	44.1
OR	11	8	27.3	1,424,645	278,000	19.5
PA	31	31	0.0	5,823,088	0	0.0
RI	4	4	0.0	528,853	0	0.0
SC	12	12	0.0	1,549,312	0	0.0
SD	2	2	0.0	185,983	0	0.0
TN	15	0	100.0	2,221,020	2,221,020	100.0
TX	56	5	91.1	12,580,122	12,268,259	97.5
UT	10	0	100.0	1,197,900	1,197,900	100.0
VA	22	22	0.0	3,979,119	0	0.0
VT	0	N/A	N/A	0	N/A	N/A
WA	23	0	100.0	2,697,616	2,697,616	100.0
WI	13	0	100.0	1,666,474	1,666,474	100.0
WV	2	2	0.0	246,203	0	0.0
WY	2	0	100.0	110,108	110,108	100.0
Total/AVG	**841**	**241**	**71.3**	**151,407,035**	**111,465,519**	**73.6**

Source: GAO analysis of EPA data.

	Medium					
	Number of systems			Population of medium systems		
State	Total number of systems	Number of systems with milestones	Percent of systems without milestones	Total population served	Population in systems without milestones	Percent of population in systems without milestones
AK	**23**	0	100.0	**200,798**	200,798	100.0
AL	**266**	0	100.0	**2,944,220**	2,944,220	100.0
AR	**139**	133	4.3	**1,190,159**	31,091	2.6
AZ	**105**	0	100.0	**1,227,834**	1,227,834	100.0
CA	**478**	0	100.0	**7,476,807**	7,476,807	100.0
CO	**131**	0	100.0	**1,726,744**	1,726,744	100.0
CT	**48**	48	0.0	**926,493**	0	0.0
DC	**1**	0	100.0	**11,000**	11,000	100.0
DE	**24**	0	100.0	**298,763**	298,763	100.0
FL	**310**	2	99.4	**4,684,659**	4,655,307	99.4
GA	**184**	94	48.9	**2,254,876**	1,068,475	47.4
HI	**33**	0	100.0	**378,964**	378,964	100.0
IA	**116**	12	89.7	**1,173,595**	1,099,226	93.7
ID	**41**	3	92.7	**401,222**	355,215	88.5
IL	**396**	378	4.5	**5,176,451**	192,293	3.7
IN	**188**	187	0.5	**2,025,670**	3,661	0.2
KS	**81**	75	7.4	**836,216**	24,796	3.0
KY	**231**	0	100.0	**2,657,189**	2,657,189	100.0
LA	**203**	0	100.0	**1,827,405**	1,827,405	100.0
MA	**217**	81	62.7	**3,788,166**	2,339,423	61.8
MD	**53**	1	98.1	**623,854**	620,429	99.5
ME	**32**	0	100.0	**339,255**	339,255	100.0
MI	**249**	204	18.1	**3,078,142**	477,742	15.5
MN	**140**	44	68.6	**1,821,460**	1,359,303	74.6
MO	**173**	166	4.0	**1,596,299**	39,249	2.5
MS	**189**	0	100.0	**1,758,806**	1,758,806	100.0
MT	**28**	0	100.0	**258,541**	258,541	100.0
NC	**226**	0	100.0	**2,496,100**	2,496,100	100.0
ND	**19**	19	0.0	**229,025**	0	0.0
NE	**38**	0	100.0	**403,073**	403,073	100.0
NH	**34**	0	100.0	**404,279**	404,279	100.0

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	Medium					
	Number of systems			Population of medium systems		
State	Total number of systems	Number of systems with milestones	Percent of systems without milestones	Total population served	Population in systems without milestones	Percent of population in systems without milestones
NJ	207	0	100.0	3,419,920	3,419,920	100.0
NM	55	0	100.0	701,119	701,119	100.0
NV	28	0	100.0	229,455	229,455	100.0
NY	294	0	100.0	3,698,727	3,698,727	100.0
OH	280	0	100.0	3,593,577	3,593,577	100.0
OK	122	105	13.9	1,225,346	130,815	10.7
OR	94	28	70.2	1,222,949	862,909	70.6
PA	292	281	3.8	3,685,523	139,384	3.8
RI	22	18	18.2	420,039	43,700	10.4
SC	141	141	0.0	1,666,077	0	0.0
SD	30	30	0.0	258,637	0	0.0
TN	236	0	100.0	2,745,416	2,745,416	100.0
TX	750	46	93.9	7,370,002	6,950,037	94.3
UT	85	0	100.0	1,088,639	1,088,639	100.0
VA	126	104	17.5	1,783,530	346,752	19.4
VT	30	8	73.3	266,690	151,730	56.9
WA	170	0	100.0	2,217,060	2,217,060	100.0
WI	160	0	100.0	1,696,466	1,696,466	100.0
WV	80	77	3.8	756,976	28,025	3.7
WY	22	0	100.0	225,116	225,116	100.0
Total/AVG	7,620	2,285	70.0	92,487,329	64,944,835	70.2

Source: GAO analysis of EPA data.

	Small					
	Number of systems			Population of small systems		
State	Total number of systems	Number of systems with milestones	Percent of systems without milestones	Total population served	Population in systems without milestones	Percent of population in systems without milestones
AK	**412**	0	100.0	**128,713**	128,713	100.0
AL	**342**	0	100.0	**437,400**	437,400	100.0
AR	**582**	548	5.8	**569,267**	23,567	4.1
AZ	**675**	0	100.0	**334,986**	334,986	100.0
CA	**2,488**	0	100.0	**995,796**	995,796	100.0
CO	**684**	0	100.0	**378,345**	378,345	100.0
CT	**529**	443	16.3	**160,534**	16,676	10.4
DC	**1**	0	100.0	**0**	0	N/A
DE	**202**	0	100.0	**92,110**	92,110	100.0
FL	**1,503**	9	99.4	**799,213**	793,025	99.2
GA	**1,484**	660	55.5	**601,723**	324,449	53.9
HI	**78**	0	100.0	**72,007**	72,007	100.0
IA	**1,019**	64	93.7	**614,789**	562,918	91.6
ID	**707**	81	88.5	**211,117**	182,893	86.6
IL	**1,367**	1,216	11.0	**1,071,477**	92,176	8.6
IN	**638**	628	1.6	**503,685**	4,818	1.0
KS	**824**	649	21.2	**560,103**	115,971	20.7
KY	**179**	0	100.0	**259,090**	259,090	100.0
LA	**893**	0	100.0	**743,960**	743,960	100.0
MA	**278**	83	70.1	**161,166**	110,437	68.5
MD	**440**	271	38.4	**217,804**	87,464	40.2
ME	**366**	0	100.0	**165,359**	165,359	100.0
MI	**1,158**	971	16.1	**716,406**	173,559	24.2
MN	**811**	143	82.4	**531,720**	395,653	74.4
MO	**1,281**	1,168	8.8	**739,179**	38,519	5.2
MS	**980**	1	99.9	**1,032,244**	1,031,729	100.0
MT	**647**	2	99.7	**206,237**	203,914	98.9
NC	**1,924**	0	100.0	**726,326**	726,326	100.0
ND	**299**	284	5.0	**177,573**	8,747	4.9
NE	**566**	0	100.0	**304,924**	304,924	100.0
NH	**662**	0	100.0	**200,898**	200,898	100.0

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	Small					
	Number of systems			Population of small systems		
State	Total number of systems	Number of systems with milestones	Percent of systems without milestones	Total population served	Population in systems without milestones	Percent of population in systems without milestones
NJ	381	0	100.0	257,045	257,045	100.0
NM	586	0	100.0	251,374	251,374	100.0
NV	220	0	100.0	106,349	106,349	100.0
NY	2,492	1	100.0	1,131,590	1,131,240	100.0
OH	1,014	0	100.0	739,441	739,441	100.0
OK	1,004	378	62.4	679,858	332,062	48.8
OR	769	108	86.0	324,386	251,660	77.6
PA	1,813	1,670	7.9	960,679	50,135	5.2
RI	57	40	29.8	26,914	10,630	39.5
SC	506	483	4.5	270,387	8,152	3.0
SD	435	382	12.2	216,413	12,348	5.7
TN	430	0	100.0	417,026	417,026	100.0
TX	3,683	165	95.5	2,724,725	2,554,606	93.8
UT	356	0	100.0	208,654	208,654	100.0
VA	1,117	874	21.8	482,223	95,023	19.7
VT	405	42	89.6	172,502	138,701	80.4
WA	2,084	0	100.0	693,052	693,052	100.0
WI	913	0	100.0	517,366	517,366	100.0
WV	455	432	5.1	413,870	10,363	2.5
WY	252	0	100.0	103,403	103,403	100.0
Total/AVG	42,991	11,796	72.6	24,411,408	16,895,059	69.2

Source: GAO analysis of EPA data.

Number of Lead Rule Violations Reported to EPA Between 1995 and June 2005 (by State)

State	Number of systems	Number of violations			Number of systems with violations				
		TT	MR	Total	TT	Percent of total systems with TT violations	MR	Percent of total systems with MR violations	Total	Percent of total systems with violations
AK	436	4	586	**590**	3	0.7	252	57.8	**254**	58.3
AL	619	0	91	**91**	0	0.0	65	10.5	**65**	10.5
AR	729	28	38	**66**	23	3.2	32	4.4	**50**	6.9
AZ	793	0	1,100	**1,100**	0	0.0	419	52.8	**419**	52.8
CA	3,126	0	144	**144**	0	0.0	136	4.4	**136**	4.4
CO	831	28	262	**290**	10	1.2	195	23.5	**201**	24.2
CT	586	29	232	**261**	25	4.3	168	28.7	**176**	30.0
DE	229	0	3	**3**	0	0.0	3	1.3	**3**	1.3
FL	1,889	10	74	**84**	10	0.5	68	3.6	**76**	4.0
GA	1,691	8	1,927	**1,935**	8	0.5	1,015	60.0	**1,016**	60.1
HI	115	0	0	**0**	0	0.0	0	0.0	**0**	0.0
IA	1,143	1	100	**101**	1	0.1	85	7.4	**86**	7.5
ID	752	9	866	**875**	9	1.2	269	35.8	**274**	36.4
IL	1,793	292	670	**962**	170	9.5	330	18.4	**423**	23.6
IN	840	90	279	**369**	54	6.4	127	15.1	**138**	16.4
KS	911	62	105	**167**	44	4.8	83	9.1	**119**	13.1
KY	418	0	200	**200**	0	0.0	147	35.2	**147**	35.2
LA	1,111	0	132	**132**	0	0.0	132	11.9	**132**	11.9
MA	524	81	219	**300**	60	11.5	137	26.1	**189**	36.1
MD	502	69	231	**300**	40	8.0	156	31.1	**165**	32.9
ME	399	63	188	**251**	44	11.0	88	22.1	**107**	26.8
MI	1,438	9	116	**125**	8	0.6	101	7.0	**107**	7.4
MN	965	3	104	**107**	3	0.3	76	7.9	**77**	8.0
MO	1,465	2	420	**422**	2	0.1	330	22.5	**332**	22.7
MS	1,171	0	35	**35**	0	0.0	32	2.7	**32**	2.7
MT	678	8	590	**598**	8	1.2	225	33.2	**228**	33.6
NC	2,174	233	411	**644**	143	6.6	269	12.4	**356**	16.4
ND	320	7	36	**43**	6	1.9	16	5.0	**20**	6.3
NE	606	59	4	**63**	58	9.6	4	0.7	**62**	10.2
NH	698	18	107	**125**	14	2.0	91	13.0	**100**	14.3
NJ	609	3	108	**111**	3	0.5	79	13.0	**81**	13.3
NM	645	0	54	**54**	0	0.0	49	7.6	**49**	7.6

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		Number of violations			Number of systems with violations					
State	Number of systems	TT	MR	Total	TT	Percent of total systems with TT violations	MR	Percent of total systems with MR violations	Total	Percent of total systems with violations
NV	253	1	113	**114**	1	0.4	84	33.2	**84**	33.2
NY	2,818	62	451	**513**	52	1.8	327	11.6	**362**	12.8
OH	1,321	38	767	**805**	35	2.6	421	31.9	**436**	33.0
OK	1,135	2	311	**313**	1	0.1	120	10.6	**120**	10.6
OR	874	138	94	**232**	94	10.8	65	7.4	**127**	14.5
PA	2,136	75	800	**875**	72	3.4	528	24.7	**572**	26.8
RI	83	1	4	**5**	1	1.2	4	4.8	**4**	4.8
SC	659	92	365	**457**	60	9.1	218	33.1	**238**	36.1
SD	467	4	431	**435**	4	0.9	211	45.2	**213**	45.6
TN	681	0	36	**36**	0	0.0	19	2.8	**19**	2.8
TX	4,489	46	54	**100**	29	0.6	54	1.2	**81**	1.8
UT	451	0	315	**315**	0	0.0	186	41.2	**186**	41.2
VA	1,265	52	253	**305**	47	3.7	185	14.6	**221**	17.5
VT	435	8	135	**143**	7	1.6	108	24.8	**114**	26.2
WA	2,277	4	1,548	**1,552**	4	0.2	1,272	55.9	**1,276**	56.0
WI	1,086	10	210	**220**	8	0.7	129	11.9	**134**	12.3
WV	537	3	335	**338**	3	0.6	153	28.5	**154**	28.7
WY	276	1	98	**99**	1	0.4	80	29.0	**80**	29.0
Total	**51,449**	**1,653**	**15,752**	**17,405**	**1,165**	**2.3**	**9,343**	**18.2**	**10,041**	**19.5**

Legend: TT = treatment technique violations, including failure to install optimal corrosion control treatment, failure to meet water quality control parameters, failure to replace lead service lines, and failure to meet public education requirements, among other things.

MR = monitoring and reporting violations, including the failure to conduct required testing and failure to report the results.

Source: GAO analysis of EPA data.

Note: The total number of systems with violations, and the numbers of systems with TT and MR violations do not add to the total numbers of violations because in some cases, systems have more than one type of violation.

Information on Selected EPA and State Enforcement Actions, by Type, from 1995 to June 2005[a]

	Years											
Type of Action	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**Totals**
Public notification requested												
State	1,359	1,070	1,190	1,223	1,097	791	988	934	1,136	940	1,174	**11,902**
Federal	277	28	15	5	6	8	3	9	1	1	3	**356**
Formal notice of violation												
State	969	700	526	452	499	602	606	581	649	549	647	**6,780**
Federal	614	273	83	177	73	39	91	4	8	22	6	**1,390**
Bilateral compliance agreement												
State	52	119	79	87	60	40	69	91	99	89	24	**837**
Federal	0	5	1	2	0	0	0	0	1	0	0	**9**
Administrative orders												
State (without penalties)	107	93	89	114	83	45	89	68	71	78	21	**837**
State (with penalties)	84	67	42	319	97	52	52	56	49	57	5	**880**
Federal (proposed)	561	153	4	1	0	0	0	3	0	0	0	**272**
Federal (final)	145	146	197	64	29	13	9	10	24	17	5	**659**
Administrative penalties assessed												
State	11	28	19	21	26	10	41	31	33	30	3	**253**
Complaint for penalty issued[b]												
Federal	9	0	10	10	8	3	0	3	0	0	0	**43**
Civil cases referred												
State (to attorney general)	10	15	21	13	10	3	3	1	9	9	3	**97**
Federal (to Department of Justice)	0	0	4	1	0	0	0	0	0	54	0	**59**
Criminal cases filed												
State	1	2	1	0	3	0	0	0	0	0	0	**7**
Federal	0	0	0	0	0	0	0	0	0	0	0	**0**

Source: GAO analysis of EPA data.

Notes:

[a]We included the most commonly used enforcement actions in this table and excluded miscellaneous actions and activities unrelated to enforcement or the lead rule.

[b]EPA files a "complaint for penalty" when the terms of an administrative order are violated.

Comments from the Environmental Protection Agency

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

NOV 18 2006

OFFICE OF
WATER

John B. Stephenson
Director, Natural Resources and the Environment
Government Accountability Office
Washington, DC 20548

Dear Mr. Stephenson:

Thank you for the opportunity to review the proposed Government Accountability Office (GAO) Report; *Drinking Water: EPA Should Strengthen Ongoing Efforts to Ensure that Consumers are Protected from Lead Contamination*. We appreciate the information in the report and are fully committed to strengthening consumer protections from lead contamination..

As your report acknowledges, the Environmental Protection Agency (EPA) has been working since early 2004 to better understand implementation of the Lead and Copper Rule nationwide. On March 7, 2005, we announced the Drinking Water Lead Reduction Plan, a series of efforts we are undertaking to revise regulations and guidance in order to improve implementation of the rule. We will continue to collect and analyze information to help us target areas where implementation needs to be further improved. We want to ensure this rule, which has been critical in lowering exposure to lead in drinking water, continues to be successful.

Your staff evaluated (1) the completeness of information that EPA has to evaluate implementation, (2) areas of the rule where modifications could strengthen public health protection, and (3) the availability of information to assess the quality of drinking water in schools and child care facilities with respect to lead. I would like to respond to your findings in each of these areas.

Lead Compliance Information

Your report fairly represents the challenges that we faced in working to understand the effectiveness of the rule in reducing exposure to lead in drinking water. In initiating our review, our focus was on understanding the extent to which utilities were currently exceeding the 15 ppb action level. While states were responsive to our immediate request, your report correctly indicates that many have not continued to focus on adding new data reported by utilities to the database. We will continue to emphasize to states the importance of having this data to understand national implementation and will work with our Office of Enforcement and Compliance Assurance to assess the adequacy of enforcement efforts.

Your report stresses that information on how utilities have met milestones associated with taking steps to meet the rule is important in determining the effectiveness of implementation. As you noted, our Safe Drinking Water Information System (SDWIS) has incomplete data for milestones that were effective with revisions to the rule in 2000. However, while your report accurately characterizes the incompleteness of new milestones, we believe it is important to note that an absence of new milestone data does not necessarily mean that utilities did not take steps to implement corrosion control. Many states failed to update their data to convert the older milestones that were used with the 1991 rule into the new milestones for individual systems. For example, in Wisconsin, although none of the 13 large systems have the new DEEM or DONE milestones in SDWIS, 9 did have a milestone under the old data structure to indicate that optimal corrosion control treatment had been installed. However, notwithstanding that difference, it is accurate to state that data for milestones - under both the old and new structures - is incomplete. We will work with states over the coming year to ensure that relevant information is loaded into SDWIS.

Reassessment of the Regulation

Your report describes several areas where you believe there are opportunities to improve the effectiveness of the rule. We agree with GAO that these areas warrant additional attention and we are addressing some of them (e.g., criteria for reducing monitoring, customer notification, management of treatment changes) as part of our package of revisions to the Lead and Copper Rule that we will be proposing early in the new year. Our decision to revise several provisions in the rule was based on a review of our information request to states asking how they were implementing provisions of the rule and feedback we heard from stakeholders during the expert workshops we conducted during 2004.

However, we need additional information before we can address several of the other issues discussed in the report, including data on the effectiveness of lead service line replacement programs and analysis to determine appropriate monitoring requirements for combined distribution systems. Ongoing research projects being funded by the American Water Works Association Research Foundation should help inform efforts on lead service line replacement and the sufficiency of existing requirements related to lead content and leaching potential of devices used in residential plumbing.

Programs to Control Lead in Drinking Water at School and Child Care Facilities

We take seriously the issue of lead in schools and child care facilities, as children are more vulnerable to the negative effects of lead. We agree with you that there is insufficient information to determine whether there are widespread problems with lead in school drinking water. However, we understand the concerns that water utilities have about being considered the

responsible party for drinking water quality within specific facilities. Although some water utilities are working with local communities to facilitate testing, ultimately they have no authority over conditions within a specific facility. We believe that approaches such as that in Connecticut, which requires testing of drinking water to be conducted as part of the licensing process for child care facilities, represent a more commonsense approach to ensuring that children are protected. We also acknowledge the concerns of state administrators about balancing risks of exposure to lead in drinking water with other environmental exposures within school environments.

Because there are no federal requirements for testing drinking water in schools that are not already a public water system, we are strongly advocating a voluntary program to encourage school districts to test drinking water. As your report notes, we have entered into a memorandum of understanding with the Department of Education, Centers for Disease Control and Prevention, Association of State Drinking Water Administrators and associations representing drinking water utilities. We are committed to work with these organizations and other organizations representing schools and child care facilities to encourage greater consideration of drinking water quality. We are working to release a revised guidance document for testing drinking water in schools and additional products over the next several months.

Our experience with the lead rule reminds us that a regulation is only effective if it is effectively implemented. We understand that EPA regional staff, state staff, and utility managers face challenges in carrying out federal requirements in addition to their other duties. But the experience of Washington, DC reminds us of the importance of maintaining public confidence in the safety of drinking water. We believe that improvements are already happening due to the renewed emphasis on rule. Many states have begun efforts to review their programs and have already made changes to improve oversight and reporting. However, staff at local, state and federal levels must continue to carry out implementation and oversight activities to ensure that public confidence is maintained.

I appreciated the opportunity to coordinate with your staff on this project. Should you need additional information or have further questions, please contact me or Cynthia C. Dougherty, Director of the Office of Ground Water and Drinking Water at (202) 564-3750.

Sincerely,

Benjamin H. Grumbles
Assistant Administrator

GAO Contact and Staff Acknowledgments

GAO Contact

John B. Stephenson (202) 512-3841

Staff Acknowledgments

In addition to the individual named above, Ellen Crocker, Nancy Crothers, Sandra Edwards, Maureen Driscoll, Benjamin Howe, Julian Klazkin, Jean McSween, Chris Murray, and George Quinn, Jr. made key contributions to this report.

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